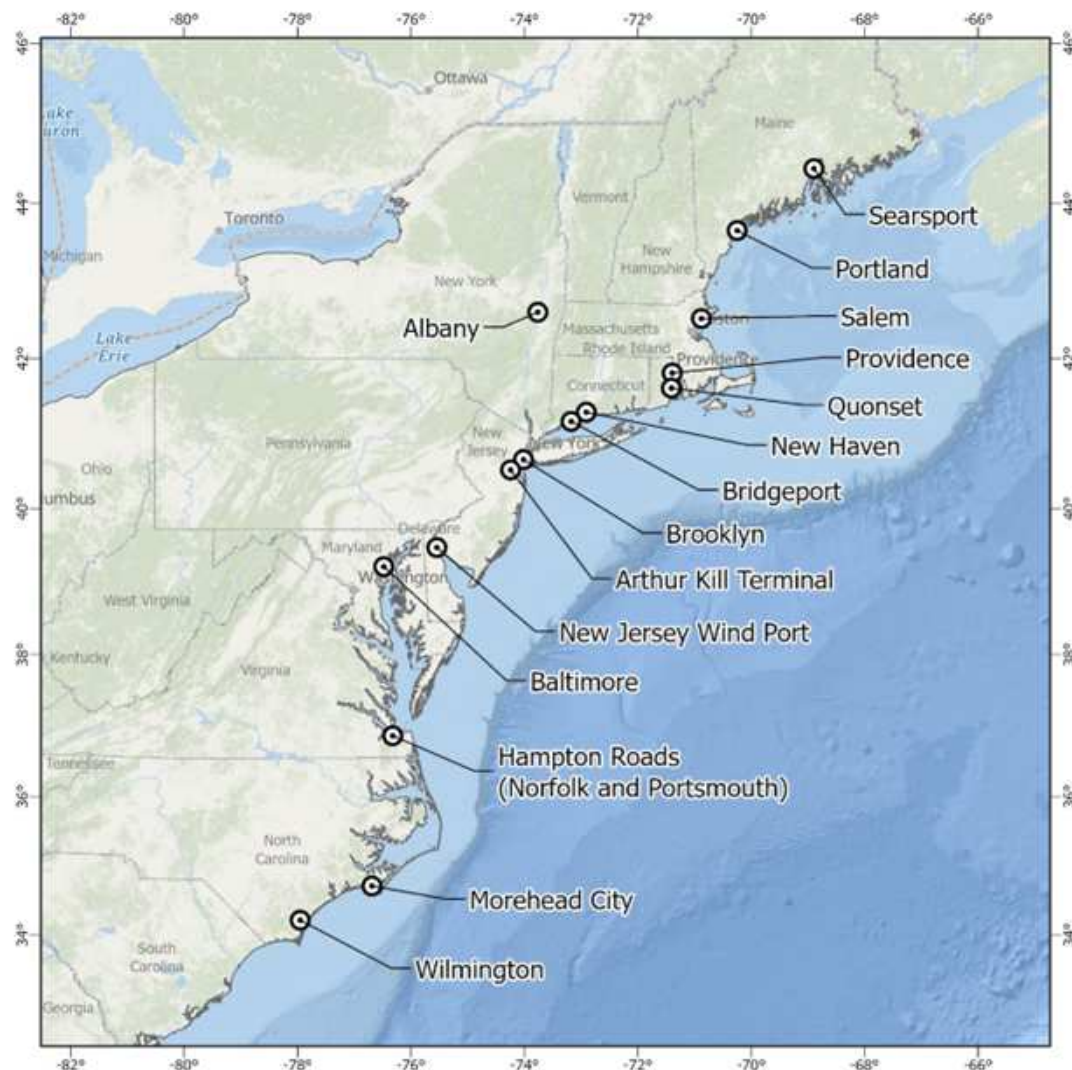


The Identification of Port Modifications and Their Environmental and Socioeconomic Consequences: 2024 Update



U.S. Department of the Interior
Bureau of Ocean Energy Management
Headquarters, Sterling, VA

The Identification of Port Modifications and Their Environmental and Socioeconomic Consequences: 2024 Update

April 2025

Authors:

Daniel Binkney
Suanna Crowley
Maigan Dunlap
Stephanie Healey
Marley Martin
Chris Moelter
Briana Mosely
Oliver Pahl
Mitchell Stallman
Jeff Wakefield
Jessie Webber

Prepared under Contract 47QRAA19D004C, Task Order No. 140M0123F0061

By
SWCA Incorporated
20 East Thomas Road
Phoenix, Arizona
85012

**U.S. Department of the Interior
Bureau of Ocean Energy Management
Headquarters, Sterling, VA**



DISCLAIMER

Study concept, oversight, and funding were provided by the U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM), Environmental Studies Program, Washington, DC, under Contract Number 47QRAA19D004C. This report has been technically reviewed by BOEM and it has been approved for publication. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of BOEM, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

REPORT AVAILABILITY

Download a PDF file of this report at https://espis.boem.gov/Final%20Reports/BOEM_2025-022.pdf.

Visit BOEM's website to [search other studies](#) completed by BOEM's Environmental Studies Program.

CITATION

Binkney D, Crowley S, Dunlap M, Healey S, Martin M, Moelter C, Mosely B, Pahl O, Stallman M, Wakefield J, Webber J (SWCA Incorporated, Phoenix, AZ). 2025. The identification of port modifications and their environmental and socioeconomic consequences: 2024 update. Sterling (VA): U.S. Department of the Interior, Bureau of Ocean Energy Management. 417 p. Report No.: OCS Study BOEM 2025-022. Contract No.: 47QRAA19D004C.

Contents

List of Figures	iii
List of Tables	iv
List of Abbreviations and Acronyms	v
1 Introduction	1
1.1 Study Background	1
1.2 Study Deliverables	2
1.3 Organization of this Document	2
2 Expert Discussions	3
2.1 Overview	3
2.2 Key Themes	4
3 Required Port Characteristics	5
3.1 Introduction to Offshore Wind	5
3.2 Overview of Offshore Wind Port Uses	6
3.2.1 Manufacturing and Fabrication	6
3.2.2 Staging and Installation	6
3.2.3 Operations and Maintenance	8
3.3 Overview of Wind Facility Components	11
3.3.1 Foundations	11
3.3.2 Floating Foundations	15
3.3.3 Cables	16
3.3.4 Turbines	17
3.3.5 Substations	18
3.4 Overview of Port Activities	20
3.4.1 Component Loading and Unloading	21
3.4.2 Component Transportation Within the Port	23
3.4.3 Component Storage and Preparation	25
3.4.4 Potential Activities and Use Conflicts	26
3.5 Summary of Port Requirements to Support Offshore Wind	29
3.5.1 Manufacturing and Fabrication Ports	30
3.5.2 Staging and Installation Ports	30
3.5.3 Operations and Maintenance Ports	36
3.6 Current Status of Ports and Planned and Implemented Port Expansions	36
3.6.1 Current Status of U.S. Ports	37
3.6.2 Existing U.S. Offshore Wind Energy Market	38
3.6.3 Port Modifications for Wind Energy Development	38
3.6.4 Port Networks	39
3.7 Summary	39
4 Port Identification	40
4.1 Identifying Existing Atlantic Ports	41
4.2 Initial Screening	41
4.3 Port Selection	41
5 Overview of Port Modifications, Impacts, and Expected Mitigation	44
5.1 Port Modifications	44
5.2 Impact-Causing Elements	44
5.3 Overview of Impacts Anticipated from a Typical Port Modification	48
5.3.1 Air Quality	49

5.3.2	Cultural Resources.....	49
5.3.3	Ecological Resources.....	49
5.3.4	Socioeconomic Considerations.....	51
5.4	Mitigation Measures.....	54
5.4.1	Overview of Mitigation Types.....	54
5.4.2	Mitigation by Impact Categories.....	55
6	Environmental and Socioeconomic Port Profiles	58
6.1	Introduction to Port Profiles	58
6.2	Port Overview	58
6.2.1	Existing Capabilities	58
6.2.2	Potential Port Modifications.....	60
6.3	Air Quality	61
6.3.1	Attainment Status.....	62
6.3.2	Impacts.....	64
6.4	Cultural Resources	67
6.4.1	Existing Conditions.....	67
6.4.2	Impacts.....	68
6.5	Ecological Resources	69
6.5.1	Existing Conditions.....	69
6.5.2	Impacts.....	72
6.6	Socioeconomics.....	74
6.6.1	Existing Conditions.....	74
6.6.2	Impacts.....	76
7	Conclusions.....	77
7.1	Port Modifications	78
7.2	Potential Environmental and Socioeconomic Impacts	80
7.3	Further Research Needs	82
7.4	Recommendations	82
8	References.....	83
8.1	Introduction	83
8.2	Expert Discussions	83
8.3	Required Port Characteristics.....	83
8.4	Port Identification	86
8.5	Overview of Port Modifications, Impacts, and Expected Mitigation.....	86
8.6	Environmental and Socioeconomic Port Profiles	87
8.7	Conclusions	95
	Appendix A: Port Characterization	96
	Appendix B: Port Profiles.....	114

List of Figures

Figure 3.2-1. Crew transfer vessel	9
Figure 3.2-2. Service operation vessel	10
Figure 3.3-1. Components of an offshore wind project.....	11
Figure 3.3-2. Monopile foundation	12
Figure 3.3-3. Gravity base foundation.....	13
Figure 3.3-4. Jacket structure base foundation.....	14
Figure 3.3-5. Suction bucket foundation	15
Figure 3.3-6. Floating foundations	16
Figure 3.3-7. Cross section of inter-array cable.....	16
Figure 3.3-8. Principal components of an offshore wind turbine.....	17
Figure 3.3-9. Wind turbine nacelle	18
Figure 3.3-10. Export cable technology vs. distance	19
Figure 3.3-11. Offshore substation on jacket foundation	20
Figure 3.4-1. Container port crane	22
Figure 3.4-2. Mobile harbor crane.....	23
Figure 3.4-3. Gantry crane	23
Figure 3.4-4. Pedestal crane on wind turbine installation vessel.....	23
Figure 3.4-5. Ro/Ro capable vessel.....	23
Figure 3.4-6. Typical lattice-boomed crawler crane	24
Figure 3.4-7. Self-propelled modular transporter	25
Figure 3.4-8. Blade storage in a port	26

List of Tables

Table 3.4-1. Summary of potential activities and use conflicts with offshore wind	27
Table 3.5-1. Example of minimum requirements to support offshore wind projects	31
Table 4.3-1. Port requirements by capability category worksheet	42
Table 4.3-2. Selected ports	43
Table 5.1-1. Construction activities likely to be required for specific port modifications	45
Table 5.2-1. Impact-causing elements likely to result from construction activities	46
Table 5.2-2. Scope of impact-causing element by resource category	48
Table 6.2-1. Port capability criteria	59
Table 6.2-2. Construction activities commonly associated with modifications intended to ensure minimum thresholds are satisfied	60
Table 6.3-1. National Ambient Air Quality Standards	61
Table 6.3-2. Attainment and maintenance status	63
Table 6.3-3. Estimated total construction emissions in U.S. tons per year	64
Table 6.3-4. Class I area analysis	65
Table 6.3-5. Estimated total operational emissions in U.S. tons per year	66
Table 6.4-1. Potential impacts to identified cultural resources and potential mitigation strategies	69
Table 6.5-1. Description and source of existing conditions data	70
Table 6.5-2. Evaluation criteria for each ecological resource	72
Table 6.6-1. Description and source of existing conditions data gathered	75
Table 6.6-2. Socioeconomic topics, impact-causing elements, and potential effects.....	76
Table 7.1-1. Summary of potential port modifications	79
Table 7.2-1. Summary of potential environmental and socioeconomic impact indicators	81
Table A-1. Criteria specific threshold values.....	97
Table A-2. Priority Ports: Regional location and potential suitability for primary activities	97
Table A-3. Priority Ports: Access and quayside capability	100
Table A-4. Priority Ports: Upland storage, Roll-On/Roll-Off capability, cranes, and transportation.....	103

List of Abbreviations and Acronyms

AC	alternating current
AQRV	Air Quality Related Values
BOEM	Bureau of Ocean Energy Management
CEEP	Connecticut Department of Energy and Environmental Protection
CFR	Code of Federal Regulations
CTV	crew transfer vessel
CWA	Clean Water Act
EFH	essential fish habitat
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GBS	gravity base structure
HAP	hazardous air pollutant
HLV	heavy-lift vessel
HVDC	high-voltage direct current
IPaC	Information for Planning and Consultation
kV	kilovolt
km	kilometer
Lo/Lo	lift-on, lift-off
MDIFW	Maine Department of Inland Fisheries
MDMF	Massachusetts Division of Marine Fisheries
MDMR	Maine Department of Marine Resources
MDNR	Maryland Department of Natural Resources
MNHESP	Massachusetts Natural Heritage & Endangered Species Program
MSA	Metropolitan Statistical Area
mt	metric ton
mt/m ²	metric ton per square meter
MTpy	metric tons per year
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NCDMF	North Carolina Division of Marine Fisheries
NCNHP	North Carolina Natural Heritage Program
NEPA	National Environmental Policy Act
NJDEP	New Jersey Department of Environmental Protection
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Marine Fisheries Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places

NYDEC	New York Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
O&M	operations and maintenance
OCS	Outer Continental Shelf
OSW	offshore wind
psf	pounds per square foot
RIDEM	Rhode Island Department of Environmental Management
Ro/Ro	roll-on, roll-off
SAV	submerged aquatic vegetation
SHPO	State Historic Preservation Officer
SOV	service operation vessel
SPMT	self-propelled modular transport unit
TNC	The Nature Conservancy
tpy	tons per year
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound
WTIV	wind turbine installation vessel

1 Introduction

The generation of electricity using wind turbines that are located offshore is a rapidly growing industry along the Atlantic Outer Continental Shelf (OCS). The Bureau of Ocean Energy Management (BOEM) has approved multiple commercial-scale offshore wind (OSW) generation projects and is reviewing additional proposals for projects that would be located along the Atlantic coast.

The scale of OSW turbine components, towers, and foundation structures limits overland transportation options and creates demand for port facilities that can handle very large loads that not all ports are currently equipped to handle. Therefore, port modifications will likely be required in the future to accommodate the needs of OSW energy developers. As the OSW energy industry develops along the Atlantic coast of the United States, it will be important for federal, state, and local stakeholders to understand the consequences of associated port modifications, including potential effects on air quality, cultural resources, ecological resources, and socioeconomic resources.

In 2016, BOEM published a study on the expansion and modification of existing ports that BOEM saw as potential candidates to accommodate OSW energy development on the Atlantic OCS (BOEM 2016). BOEM (2016) included an evaluation of some of the environmental and socioeconomic consequences of those modifications.

Since 2016, the OSW industry has matured, some new potential port sites have been identified, and industry technologies have changed. These changes affect the port locations and types of port modifications likely required to accommodate OSW energy development. This study is designed to update BOEM's 2016 effort by integrating current industry information and considering a broader range of potential impacts. Specifically, the objectives of this study are to achieve an understanding of:

- The capacity of current ports and the port modifications that could be required to accommodate activities related to OSW energy development;
- The potential consequences of port modifications as they apply to air quality, cultural resources, ecological resources, and socioeconomic resources; and
- The effectiveness of potential mitigation measures.

1.1 Study Background

In 2005, the Energy Policy Act amended Section 388 of the 1953 Outer Continental Shelf Lands Act, giving the Secretary of Interior discretionary authority to issue leases, easements, or rights-of-way for renewable energy projects on the Federal OCS. Under this authority, BOEM is charged with conducting OCS lease sales as well as monitoring and mitigating unwelcome impacts that might be associated with resource development. It is BOEM's mission to manage development of U.S. OCS energy, mineral, and geological resources in an environmentally and economically responsible way.

Port facilities are necessary to facilitate construction, operation, and decommissioning of an OSW energy project. Additionally, large project components, such as foundations, towers, nacelles, blades, inter-array and export cables, and substation topsides are typically fabricated at a port-side facility to facilitate transportation to the offshore project site. If current port capabilities cannot support the needs of OSW energy projects, it is possible that OSW energy development activities could lead to the expansion or modifications of existing ports, or to the development of new ports dedicated to OSW activities. The ability and willingness to carry out port expansion or modification will be driven by future OSW projects as well as political and economic priorities. These priorities will vary from port to port and state to state.

The expansion or modification of port facilities can produce a variety of environmental impacts, such as air and noise emissions, conversion of undeveloped areas, erosion of shorelines induced by vessel wakes, and habitat and water quality alteration caused by increased dredging. In addition, a variety of both positive and negative socioeconomic impacts may occur, such as an increase in OSW energy construction- and operations-related employment and possible decreases in employment in other economic sectors due to the changing characteristics and use of a port (e.g., a traditional fishing port changing to a wind energy hub).

As the OSW energy industry develops along the Atlantic coast, it will be important for federal, state, and local stakeholders to understand the potential consequences of such development, including the impacts from port expansion and modification and changes in port operations. In addition, project-specific environmental impact statements (EISs) will be developed, and these documents will need to account for impacts associated with the utilization of port facilities for OSW energy development. The information from this study is intended to support these objectives.

1.2 Study Deliverables

The primary deliverable associated with this study is a series of port profiles. Each port profile describes a set of hypothetical¹ port modifications, that, if implemented at the specified existing port location, would enable the port to be used as part of OSW energy development in the Atlantic OCS. Each port profile goes on to describe the consequences likely to be brought about by the specified port modification. For example, if dredging would be required as part of a hypothetical port modification, the effects of that dredging as it relates to air quality, cultural resources, ecological resources, and socioeconomic resources are outlined. These “effects evaluations” are not intended to replace project-specific assessments required under the National Environmental Policy Act (NEPA). Instead, they are designed to identify issues likely to require in-depth analysis if modification were to be undertaken at the specified port.

This document describes the data, methods, and assumptions used to accomplish the following tasks.

1. Identify a set of ports that might be used to support future Atlantic OCS wind energy development.
2. Characterize the modifications that may be required at each port if they are to support future OSW energy development.
3. Describe the likely consequences of the potential port modifications, including potential effects on air quality, cultural resources, ecological resources, and socioeconomic resources.
4. Discuss approaches that might be used to mitigate the potentially adverse impacts of port modifications.

1.3 Organization of this Document

This document’s organization largely reflects the processes used to develop study information and to create port profiles.

¹ In many cases, the hypothetical port modifications described in this study were developed by reviewing existing plans and proposals for site-specific port modifications. As necessary, this study’s authors included additional modifications to those existing plans to ensure they would accommodate the anticipated future needs of OSW developers.

- Conversations with OSW energy experts (i.e., expert discussions) were used to develop a better understanding of future OSW energy needs as they relate to port facilities. This effort is summarized in Section 2.
- Next, the team integrated the information gathered during the expert discussions with existing information and their own OSW experience to develop a set of characteristics that ports used to support future OSW energy development are likely to embody. This process, and the resulting characteristics, are described in Section 3.
- Section 4 describes the method used to identify the 16 ports for which a port profile would be developed. The data used in this process is reported in Appendix A.
- Section 5 defines “port modification” and describes how various port modifications can affect air quality, cultural resources, ecological resources, and socioeconomic resources. This section also identifies methods that can be used to mitigate potential adverse effects.
- The methods and assumptions used to develop individual port profiles are described in Section 6. The port profiles themselves are reproduced in Appendix B.
- Section 7 includes a set of recommendations and identifies future research needs.

2 Expert Discussions

2.1 Overview

Exploratory discussions were conducted with a variety of OSW energy industry experts to supplement the knowledge and experiences of the study authors. The discussions provided an opportunity to glean insights into the rapidly evolving OSW industry and ensure that this information, embedded in the port profiles, would effectively support decision makers in the coming years.

Expert discussions were implemented in three phases. The first phase sought confirmation and clarification of the ports to include in the study, the scope of the OSW technology that ports will need to support, and potential future trends of OSW that should be considered. The second phase built from the first, with a focus on filling information gaps identified during the initial development of port profiles. The third phase focused on gathering contextual information about overall considerations and challenges in the development of ports. The information from all three phases was consolidated and synthesized in an anonymous format, so no specific topic could be connected with one discussion or individual.

The topics of discussion included:

- **Port Requirements, Capabilities, and Constraints:** The primary physical characteristics of OSW ports by their function (Marshaling Ports, Staging & Integration and Floating Foundation Assembly Ports, Flexible Laydown Ports, Manufacturing Ports, and Operations and Maintenance [O&M] Ports), and the social, environmental, and physical constraints to redevelopment projects.
- **Regionalization:** The existing and prospective capabilities of the U.S. Atlantic coast OSW port system and how OSW port outlook is affected by market development across states on the eastern seaboard.
- **Financing and Timelines:** Factors impacting the financeability or business case for investing in an OSW port and how industry and government could better collaborate to address any financing risks, uncertainties, or funding gaps associated with OSW port investments.
- **Public Perception, Potential Impacts, and User Conflicts:** Impacts of port development projects on other port uses, common conflicts, and conflict management strategies for port developments.

- **Future Market Trends:** Ten-year outlook for OSW port development, including impacts of climate change and other environmental factors on port development, and technology growth expectations, specifically around floating OSW deployments on the U.S. Atlantic coast.
- **Information Needs:** Key scientific publications or research studies that should be understood and considered as part of developing this study. Includes additional information or insights that should be considered, and additional recommendations for individuals to consider engaging in conversation as part of the study process.

In total, 16 exploratory discussions were conducted with select experts. The selected group of experts provided a mix of specialization in the areas of OSW port development, infrastructure and manufacturing requirements, and permitting.

2.2 Key Themes

The experts with whom we had conversations came from different backgrounds and had varying levels of engagement in OSW energy and associated port requirements. It is important to note that, due to the small sample size of interviewees and the diversity of their experiences with and knowledge of OSW port modifications, findings summarized in this study are intended to be a partial picture of anticipated port modifications and developments on the U.S. Atlantic coast. Commentary should not be interpreted as a definitive assessment of any particular project or ongoing programs or processes. While not intended to be comprehensive, these findings provide important contributions to the study. Within this context and across these discussions, the following five key themes emerged.

1. **Cost Constraints Will Drive Regionalization, Especially for Floating OSW:** Depending on the port use, participants shared the belief that port developments across multiple Eastern Seaboard sites is unlikely to be cost effective. Several participants noted the belief that there would only be one Marshaling Port built on the East Coast, and the same for a Staging & Integration and Floating Foundation Assembly Port. Notably, floating OSW facility components require air drafts, quayside load bearing capacity and sizing, and waterside equipment (berthing, launching) that substantially exceed the requirements for fixed-bottom facilities. The cost-prohibitive nature of these investments is likely to incentivize floating OSW developers to use shared port resources to build their OSW projects in the Gulf of Maine and in other Wind Energy Areas that are more amenable to floating foundations.
2. **Decisions Made to Mitigate Some Environmental and Socioeconomic Impacts Can Exacerbate Others:** Port developers seeking to reduce impacts to neighbors or existing/alternative port uses have pursued port development far from existing population centers. This has the potential to increase costs compared to ports located in high-population density centers, especially from increased shipping and transportation costs, additional environmental permitting, the need to expand navigation channels, and a lack of local qualified labor which incurs higher wage and transit costs.
3. **Dedicated Public Funding Lines Are Needed to Support the Business Case for OSW:** Given long-term port contracting challenges, uncertain and lengthy permitting processes, and broader volatility in the nascent OSW energy market, direct and enduring public funding lines at the state and federal level are perceived as a necessary component of any port redevelopment business case. Grant programs like the U.S. Department of Transportation's (USDOT's) Infrastructure for Rebuilding America program and Maritime Administration's Port Infrastructure Development Program were cited as good models to build upon.
4. **Broader Federal Intergovernmental Coordination is Needed:** Most participants indicated the belief that the business case for OSW ports would be substantially improved by a more coordinated federal permitting process. Enhanced coordination with federal agencies that have existing OSW industry regulation experience, like BOEM, can benefit those agencies gaining

exposure, like the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) and the U.S. Army Corps of Engineers (USACE). Coordination could take multiple forms—Intergovernmental Task Forces, federal agencies serving as commentators on other federal processes, a project-specific intergovernmental working group(s), or informal communications channels.

5. **Coastal Community Perceptions of OSW Energy Development are Variable and Complex:** OSW port redevelopment projects, given their scale and novelty, are commonly perceived by local communities as being associated with both significant opportunity and the potential for significant and adverse environmental and socioeconomic impacts. Conflicting perspectives related to the impact a port infrastructure project may have on property values, viewshed, existing recreational and commercial activities, and the local workforce and economy were emphasized. Identifying “win/win” development opportunities, like the cost-effective local re-use of dredged sediment materials from navigation channel expansions for marshland rehabilitation and shoreline resilience projects, were noted as meaningful approaches to mitigate conflicts and deliver local benefits.

Overall, the experts were cautiously optimistic and viewed as feasible a future in which ports expand and modify to accommodate proposed OSW energy projects *if* additional federal funding and high-level interregional coordination are provided. These discussions confirmed the complexity of these projects and emphasized the need for early coordination between various stakeholders, especially those at the federal and state levels involved in setting interregional coordination direction and project-specific permitting of ports and OSW energy projects.

3 Required Port Characteristics

This section describes the components of OSW facilities and port characteristics required to support construction and operation associated with OSW energy development on the U.S. Atlantic coast. Identification of critical port characteristics is a precursor to identifying and evaluating the types of port modifications that may be needed to accommodate the large OSW components during both construction and during the ongoing O&M of OSW energy facilities. This section also summarizes OSW-related port modifications that have already been implemented or are being planned along the U.S. Atlantic coast as well as potential activity and use conflicts.

The work builds upon the 2016 BOEM report (BOEM 2016), the U.S. Department of Energy *Assessment of Ports for Offshore Wind Development in the U.S.* (DNV GL 2014), and other reports that review the current capability of the U.S. ports. For example, some U.S. states (e.g., New York State) have conducted state-level assessments of existing ports or sites. These assessments were referenced, as were publicly available conceptual level design documents (e.g., Moffat & Nichol’s Concept Design Report for Searsport, ME [Moffat & Nichol 2021]), which often provide the required port characteristics that are used as design criteria for proposed modifications.

3.1 Introduction to Offshore Wind

BOEM is responsible for issuing U.S. Atlantic coast OCS lease sales as well as identifying and mitigating to the extent practicable environmental and certain socioeconomic impacts associated with OSW energy development. Although the U.S. OSW industry is still in its early stages compared to Europe, it is recognized that port facilities are a critical piece in the development and operation of an OSW energy facility. As of the writing of this report, few existing ports on the U.S. Atlantic coast are capable of fully supporting an OSW energy project; however, port modifications are planned, and in some cases are already underway, to accommodate OSW energy facility construction and operations.

Based on U.S. and European experiences as well as studies conducted in the United States and abroad, the following port characteristics have been identified as critical to the support of OSW energy development:

- Vessel access (e.g., access channel width and depth, turning ability, and overhead draft)
- Quayside lifting or component transfer capabilities sufficient for the weight and height of components (e.g., crane types, height restrictions, and roll-on, roll-off capability)
- Bearing capacity of the quayside, storage area, and haul routes
- Number of berths and size of storage area
- Available transportation infrastructure (e.g., rail and highway access)
- Location (e.g., distance from wind energy areas and skilled work force)

Section 3.2 provides an overview of the intended uses of ports for OSW energy, including manufacturing and fabrication; staging and installing; and O&M. Sections 3.3 and 3.4 provide an overview of the components needed for a wind facility and the activities that would take place at the port, respectively. Section 3.5 provides a summary of the port requirements necessary to support OSW wind energy, by both component and activity, and Section 3.6 provides a summary of the current ability of U.S. ports to support OSW, with a discussion of the existing OSW energy market and the potential port uses and conflicts. Section 3.7 summarizes key points from this section.

3.2 Overview of Offshore Wind Port Uses

Port facilities are necessary to support construction, operation, and decommissioning of an OSW project. Additionally, larger project components may be fabricated at a port-side facility to simplify transportation to the OSW project site. The following section summarizes the ways in which ports are used to support OSW projects.

3.2.1 Manufacturing and Fabrication

Large and heavy OSW components, such as foundations, towers, nacelles, blades, inter-array and export cables, and substation topsides, are typically manufactured in a facility located on the water with port access. Components are then loaded directly onto a vessel and transported to a project's staging port or directly to the project site itself. This waterborne transportation-based approach is typical when components are too large or too heavy to be transported by road or rail. For example, an 11-megawatt (MW) turbine nacelle (which was installed at the Coastal Virginia Offshore Wind project [Durakovic 2021]) is too large to be readily transported by road or rail due to its width and height. Although a large nacelle could be delivered to the staging port in pieces for final assembly, it is typically preferable to complete final assembly in the controlled environment of the manufacturer's facility.

If the manufacturing or fabrication facility is located relatively close to the OSW project site, the project may choose to deploy that component directly to the site for installation rather than staging the component elsewhere. In the U.S. market, where fewer component manufacturing facilities currently exist relative to Europe or Asia, it is expected that developers will continue to stage components at ports rather than directly transporting them from manufacturing facilities to OSW project sites (see Section 3.2.2).

3.2.2 Staging and Installation

During the construction phase of an OSW energy project, the most common approach to date has been to identify a staging port in close proximity to the OSW energy site, and then to transport all major components from the manufacturer's facility to the staging and installation port. By assembling a sufficient stock of components, the developer can ensure that there are adequate supplies of each

component at all stages of the construction timeline to complete the installation with maximum efficiency (i.e., the least number of trips from the staging port to the installation site).

A primary reason for this approach has been that the locations of turbine or large component manufacturers were in Europe or Asia and therefore were rarely adjacent to the offshore development areas. Also, it is common for different facilities to manufacture only one type of component (i.e., blades may be made in one location, towers in another, and the nacelle elsewhere). The installation vessel would then have to visit several ports to build up a set of complete turbines onboard for transport to the project site. It is therefore considered more feasible and economical to stage the various components together in one place (a staging port) prior to transport to the offshore project site.

The use of staging ports is common practice in Europe and is expected to be the practice in the United States for the foreseeable future, as well.

The unit costs of the main installation vessel's voyage cycle are central to the decision whether to utilize a staging port. Two factors of critical importance are:

- The transit speed of the installation vessel; and
- The vessel's carrying capacity for the components being installed.

Both of these parameters strongly influence the unit voyage costs, and have led to a rapid evolution of larger, faster vessels across the wind turbine installation fleet. Additional details on installation vessels are discussed in the following section. Regardless of whether they are transporting components from the manufacturing sites or from staging ports, the installation vessels tend to have the same characteristics.

Early OSW facilities were often built using towed "jack-up" barges, that could carry one or two foundations or turbines. The National Renewable Energy Laboratory (NREL) (2024) reported that as of May 2024, the U.S. OSW vessel fleet had 22 vessels in operation and an additional 30 vessels in construction, the majority of which are crew transfer vessels (CTVs) and service operation vessels (SOVs), used primarily for O&M activities. Specialized installation vessels include wind turbine installation vessels (WTIVs), feeder barges, heavy-lift vessels (HLV), and cable-lay vessels.

WTIVs are self-propelled HLVs that can jack up onto the seabed for the installation of OSW towers and turbines. Jacking up is accomplished by lifting the entire vessel up out of the water using large-diameter, built-in "spuds" that are placed onto the seabed, and the vessel is mechanically lifted. Feeder barges support installation by transporting components from staging ports to the offshore project location. HLVs typically have a high-capacity crane and dynamic positioning capabilities designed to install foundations and substations. Cable-lay vessels spool out long lengths of array and export cables between turbines and substations.

NREL (2024) also reported on major developments to the U.S. OSW vessel fleet, including the successful launching of the U.S.'s first Jones Act-compliant WTIV, the *Charybdis*, in April 2024, and the beginning of construction of two barges and two tugboats that will support a foreign-flagged WTIV during construction of Equinor's Empire Wind project in 2026. In addition, NREL reports that four SOVs and 18 CTVs are under construction in U.S. shipyards to support OSW energy development.

An industry-wide survey conducted by NREL (2024) identified the need for four to six WTIVs to achieve national energy generation goals. Efforts are underway to increase the availability of existing WTIVs; however, to prevent potential project delays, use of foreign-flagged WTIVs and support vessels remains necessary.

3.2.3 Operations and Maintenance

During the operational phase of an OSW energy project, the focus of support for ports becomes O&M activities. These activities include:

- Monitoring, controlling, and coordinating wind farm operations;
- Maintenance and inspection, which can be subcategorized into scheduled and unscheduled maintenance activities and requires crew transport and specialized vessels; and
- Spare parts storage.

3.2.3.1 Monitoring, Controlling, and Coordinating Wind Farm Operations

Developments in advanced control and monitoring systems enable operators to undertake routine checks of operational data and to control the turbines from a remote onshore location, while scheduled and unscheduled maintenance works require the transportation and transfer of technicians to the offshore structures.

3.2.3.2 Maintenance and Inspection

3.2.3.2.1 Scheduled Maintenance and Inspection

This maintenance category includes any task or activity which is pre-planned at the design stage and typically requires the turbine to be temporarily stopped for the maintenance work to be performed. Scheduled maintenance intervals of one year are the normal practice; this differs from the quarterly or bi-annual approach intervals typically scheduled for onshore wind sites. These scheduled maintenance intervals reflect the greater expense, risk, and effort associated with accessing OSW energy sites relative to onshore sites. Scheduled maintenance and inspection tasks are performed by trained technicians who are transported to the turbines via marine vessels or helicopters and who then perform the maintenance or inspection activities equipped with basic tools and consumables.

Such scheduled tasks are often conducted on a seasonal basis, with the bulk of work being carried out in the summer to minimize the probability of lost production due to inaccessibility or feasibility of performing maintenance or inspection tasks during the inclement winter season.

3.2.3.2.2 Unscheduled Maintenance

This maintenance category includes any unplanned maintenance activities resulting from a failure of a system, sub-system, or component. The level of corrective action, and the impact of the unscheduled maintenance on the wind farm power generation, depends on the severity of the failure. Most often, failures occur within the wind turbine generator systems and only affect the output of an individual turbine. More significant failure events within the substations or cables occur far less frequently but typically have a greater impact on the number of turbines affected and the subsequent power generation, depending upon their location within the array.

These unscheduled maintenance activities are performed by trained technicians who are transported to the turbines via marine vessels or helicopters who then perform the maintenance services equipped with basic tools and consumables; however, some unscheduled maintenance activities could require the use of larger vessels such as SOVs, which are described in Section 3.2.3.2.3.2 below.

3.2.3.2.3 Crew Transport

To date, most existing OSW energy projects deploy fast specialized vessels or helicopters from onshore bases to transport technicians to and from the offshore site. As projects move further offshore, transport

vessels may also operate from fixed offshore bases or motherships to substantially reduce the time required for transiting crew to and from site. These offshore-based approaches require technicians to live for long periods of time on offshore accommodations near the wind farm, in a manner similar to offshore oil and gas sites.

A wide range of conventional and specialized vessels are currently available to provide personnel transportation and access to OSW projects from an onshore location. These vessels vary in capacity, speed, and transferring capabilities and include: CTVs; work boats; small water-plane area twin hull vessels; and hovercrafts or amphibious vehicles (for ice or inter-tidal conditions).

3.2.3.2.3.1 Crew Transport Vessels

CTVs vary in vessel type from monohull to catamarans or small twin hull vessels capable of carrying two crew and up to 12 personnel. They are typically 60 to 100 feet (18.3 to 30.5 meters [m]) in length, with drafts up to 10 feet (3 m) and can achieve speeds of 15 to 25 nautical miles per hour and may have a cargo payload of 5 tons (4.5 metric tons [mt]) or less (NYSERDA 2019).

For efficiency, one-way transit times between ports and OSW energy sites for crew transfer activities are recommended not to exceed 2 hours. Based on the average CTV speed, to be within the recommended travel time, CTV facilities should be within 50 nautical miles of the wind farm if feasible. Figure 3.2-1 depicts a typical CTV.



Figure 3.2-1. Crew transfer vessel

Source: BOEM (2016)

3.2.3.2.3.2 Service Operations Vessels

SOVs are larger ocean-going vessels used to support a variety of OSW energy activities. They can be used to transfer personnel, but are generally used for surveying, supply, remote operated vehicle support or dive support, inspection, maintenance, and repair activities. SOVs are self-contained and may be capable of extended periods of time at sea. Generally, SOVs would make port calls every 10 to 30 days (NYSERDA 2019). Figure 3.2-2 depicts an SOV.



Figure 3.2-2. Service operation vessel

Source: NREL (2023)

3.2.3.3 Spare Parts Storage

Ongoing maintenance of any wind project during the operational phase requires a supply of spare parts, including major replacement parts (e.g., blades), minor replacement parts (e.g., hydraulic units), and consumables (e.g., lubricants, air filters). Typically, the most frequently used spare parts are stored at an O&M port that is located near the project. These O&M ports typically serve as the base of operations and may also house administrative offices, small warehouses/workshops for the project, and parking for project personnel. Larger spare parts may be stored at this same port or at a different port if the vessel access or crane capacity at the O&M port is insufficient to handle the larger components, or if storage capacity is too small at the O&M port. Major spare parts, such as blades, are normally delivered directly from the supplier, as needed, or are staged at staging and installation ports; they are unlikely to be maintained at an O&M port.

An OSW energy facility also requires storage of spare lengths of inter-array cable and export cable at a port facility. These lengths of cable (typically a minimum of 3,281 feet [1,000 m] for each cable type)

must be stored at a port with adequate lifting capacity cranes and adequate upland storage space so the cable can be loaded on to a cable repair vessel. Spare cable is typically stored in a large horizontally laid coil that is inside a structure that protects the cable from environmental degradation and damage. Cable storage requires an area within the port that can be dedicated to long-term storage without interference with other port uses.

3.3 Overview of Wind Facility Components

Figure 3.3-1 presents a diagrammatic representation of a typical OSW project which includes both offshore and onshore components. Generally, multiple turbines are connected to a substation with array cables (refer to Section 3.3.3). The substation includes a foundation and a topside element (refer to Section 3.3.5) and is connected to the onshore sub-station via offshore and onshore export cables (refer to Section 3.3.3.2).

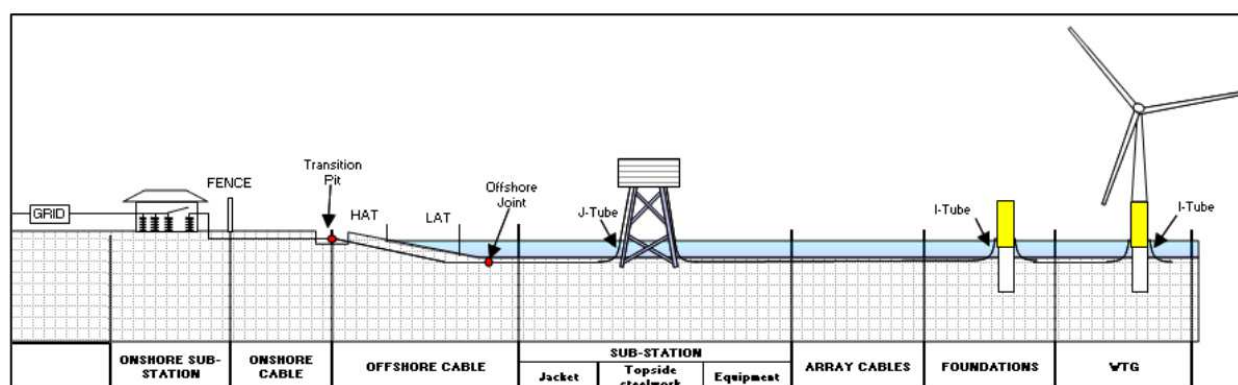


Figure 3.3-1. Components of an offshore wind project

Source: DNV GL (2014)

The following sections provide further information on specific components as a background for understanding the facilities needed at OSW ports and modifications that may be required to support the OSW energy industry.

3.3.1 Foundations

Although several types of foundations have been proposed, the foundation types described below represent the technologies commonly used today, and include steel monopile structures, gravity base structures (GBSs), and jacket structures. In some cases, foundation type is the controlling factor relative to quayside bearing capacities and crane lifting capabilities; however, at other times, it could be the wind turbine generators.

3.3.1.1 Monopiles

Monopile foundations have been economic OSW solutions in Europe and Asia across various seabed conditions and water depths. Monopiles are the most common foundation for installed OSW energy projects and are used in more than half (approximately 56%) of all operational offshore projects (Wang et al. 2018). Monopiles are expected to remain the primary foundation choice into the future since they offer a well-understood design that is typically economically and technically efficient.

A monopile foundation consists of a single steel pile, which is embedded into the seabed. Figure 3.3-2 shows a typical monopile foundation design. The depth of pile penetration into the seabed and the pile diameter and wall thickness are principally determined by the maximum water depth, seabed soil

conditions, and rated capacity of the wind turbine. The maximum water depth corresponds to the highest probable combination of high tide and storm surge.

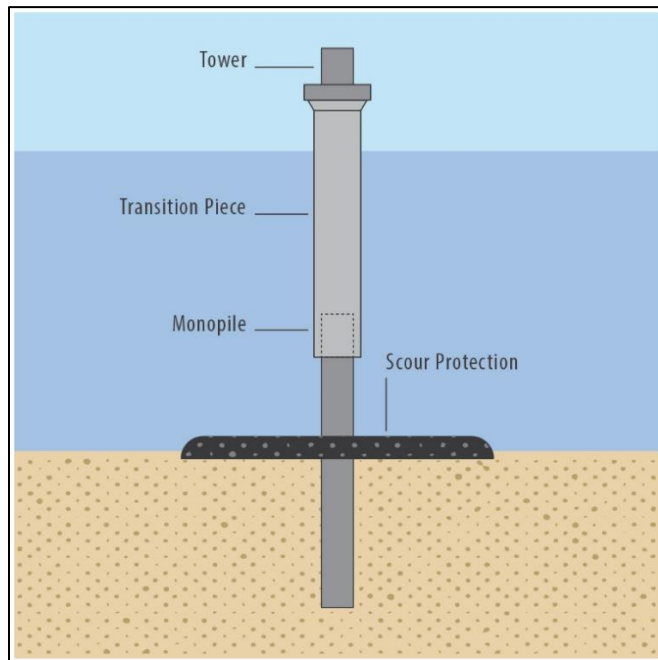


Figure 3.3-2. Monopile foundation

Source: BOEM (2021)

Most OSW energy facilities utilize monopile foundations, which consist of a single, large-diameter steel pipe (or pile) that is driven into the seabed. Sediment/seabed resistance and friction provide vertical and lateral support. Typically, the turbine tower is mounted onto the foundation via a transition piece, which itself is fixed onto the pile using a specialized grouted joint. The purpose of the grouted joint is to take up any misalignment tolerances that inevitably occur during installation of the monopile and to provide continuity of structural load transfer between the monopile and the turbine tower.

To protect the electrical cables that extend from the structure topside to the seabed, a J-tube or I-tube is typically mounted externally or internally at the base of the foundation. The J-tube or I-tube, along with other more delicate attachments such as railings, walkways, and electrical switchgear that would be damaged during pile-driving activities, are often pre-installed at the staging port on the transition piece instead of on the monopile.

The level of the top of the transition piece, or more specifically the level of the base of the tower, is determined by the necessity to maintain adequate clearance for the blades over the crests of waves during storm conditions. The size of the monopile depends on water depth, size and weight of the turbine, and the height of waves expected. To date, monopiles have been used or proposed for use in water depths up to 164 feet (50 m) (BOEM 2021); however, monopiles are expected to be feasible in depths up to 200 feet (60 m) (LEANWIND 2017). Monopiles are typically prefabricated and transported to the site as a single structure measuring as long as 260 feet (80 m) and weighing up to 1,900 tons (1,750 mt) (BOEM 2021).

3.3.1.2 Gravity Base Structures

GBSs or gravity foundations are structures with wide and heavy bases that sit directly on the seabed and use the weight of the structure to provide vertical and lateral support to the central column. The base is often made of reinforced concrete or steel. Placement requires adequate seabed bearing capacity.

As wind turbines increase in size, the use of gravity foundations has been limited due to the large overturning forces from larger and heavier turbines. They have been used in water depths up to 65 feet (20 m) (BOEM 2021), but conceptual gravity foundation designs are being developed for deeper water applications.

Gravity bases are generally constructed onshore and towed to offshore sites prior to full ballasting. For some projects, such as Middelgrunden just outside Copenhagen (Denmark), the foundations were manufactured in a dry dock and transported to the site partly submerged. Figure 3.3-3 depicts a gravity base foundation.

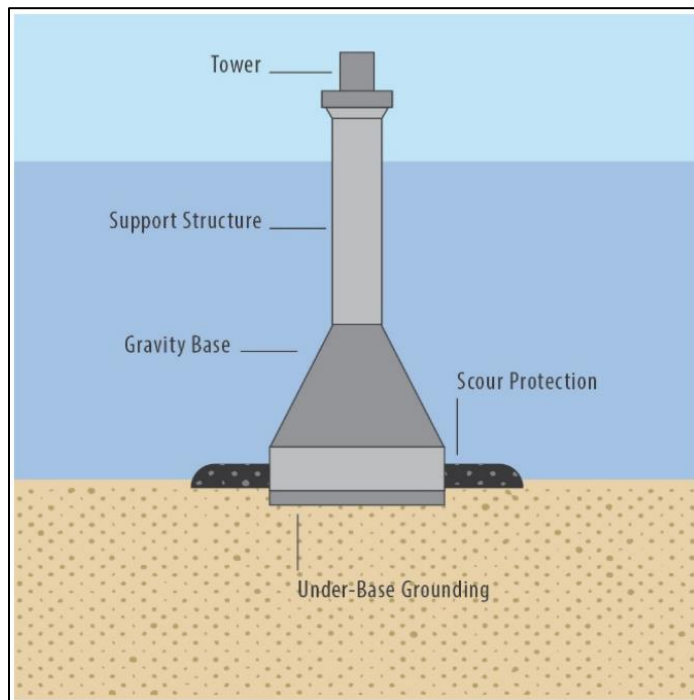


Figure 3.3-3. Gravity base foundation

Source: BOEM (2021)

3.3.1.3 Jacket Structures

Jacket foundations are lattice-truss steel structures that are usually four-legged, with legs at each corner connected by horizontal and diagonal cross-pieces. The nature of the jacket concept lends itself to a considerable number of variant geometries. These include shortened jackets that do not emerge above sea level, three-legged jackets, jackets which might be piled in-leg, and alternative leg inclination angles, among others.

Secondary steelwork such as boat landings and working and intermediate access platforms are mounted on the main lattice and would be entirely pre-installed at the fabrication yard. J-tubes are generally mounted to the brace members and are enclosed within the lattice.

Jacket foundations are typically constructed onshore and then transported to the site via flat-deck barge or specialty transport vessel, or can be floated and towed to the site. Jacket foundations are well suited for a seabed consisting of clays or dense sands, which generate the required friction for stability. They have been used for wind turbines in the 3- to 10-MW range (BOEM 2021).

Jacket foundations have been installed at OSW energy projects, including the Block Island Wind Farm in Rhode Island. Other installations include the Beatrice demonstrator site off northeastern Scotland, the Alpha Ventus facility in the German North Sea, and at the Ormonde OSW energy facility in the Irish Sea. These deployments cover a wide range of water depths, from approximately 66 feet (20 m) at Ormonde, to 98 feet (30 m) at Alpha Ventus, to 148 feet (45 m) at the Beatrice demonstration site. These sites indicate that jacket foundations are viable options for larger wind turbines, over a broad range of water depths. Figure 3.3-4 depicts a jacket foundation.

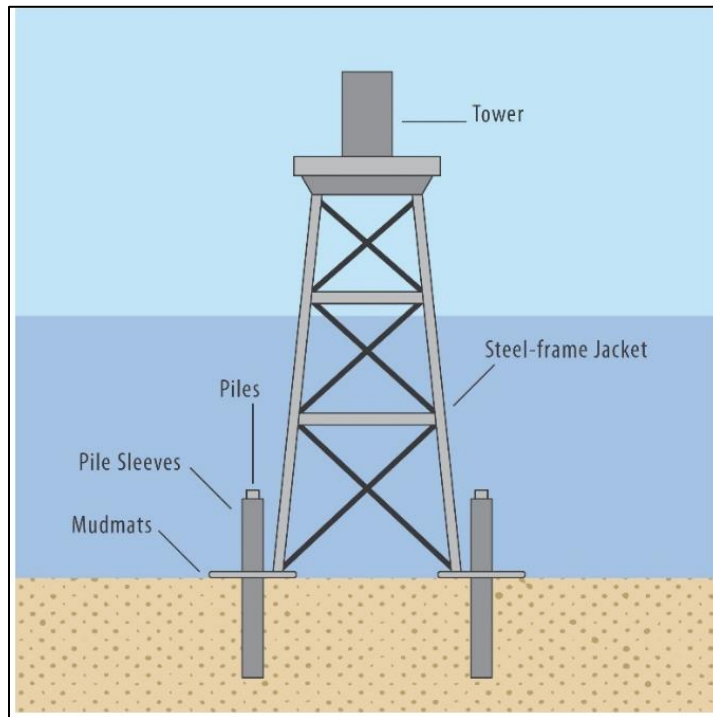


Figure 3.3-4. Jacket structure base foundation

Source: BOEM (2021)

3.3.1.4 Suction Bucket

Suction bucket structures consist of a steel column connected to a bucket, which itself consists of vertical steel skirts that extend down from a horizontal base piece that rest on the seabed. Gravity forces the vertical elements into the seabed, and seawater is pumped from the bucket which forms a “suction” to the seabed to provide stability to the overall structure.

Suction buckets are also constructed onshore and then transported via barge or towed as-is to the OSW energy site. Subsea pumps and remotely operated vehicles are used to pump the water from the bucket which forces it deeper into the seabed. Two projects, Xiangshui in 2017 and Dafeng in 2019 (Mathern 2021) installed suction bucket foundations for full-scale turbines. Additional projects have installed suction bucket bases in water depths up to 194 feet (59 m) for 12- to 19-MW turbines (BOEM 2021). Figure 3.3-5 depicts a suction bucket foundation.

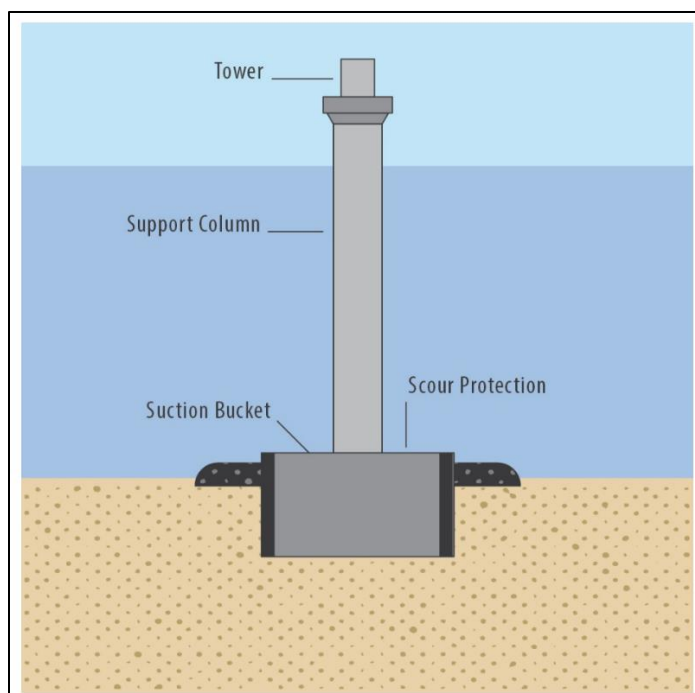


Figure 3.3-5. Suction bucket foundation

Source: BOEM (2021)

3.3.2 Floating Foundations

In U.S. Atlantic coast locations with deep water on the continental shelf (e.g., Gulf of Maine), or off the U.S. west coast, the cost for installing fixed foundation turbines becomes prohibitive due to the water depths. In these locations, the OSW energy industry has moved toward floating foundations. Floating OSW energy projects have been built or proposed for waters in excess of 200 feet (60 m), although floating foundations have not yet been installed commercially in the United States.

The three most common design concepts for floating OSW foundations are spars, semi-submersibles, and tension leg platforms. Spars have a single ballasted cylinder that supports the tower and extends below the waterline. The submerged, weighted spar keeps the structure upright. Semi-submersibles utilize semi-submerged columns or hulls attached with horizontal and diagonal connecting elements. The hulls have sufficient buoyancy for the overall structure to float and resist overturning. Tension leg platforms are buoyant steel floating platforms that are moored to the seabed by a series of vertical tendons. Each floating foundation concept is anchored to the seabed to remain in place.

Advantages of floating foundations include the ease of installation, the elimination of heavy-lift or specialty installation vessels, and the ability to deploy in much deeper water than fixed foundations. Foundations are typically constructed at waterside manufacturing facilities on land and floated to the site via ocean-class tugs and barges.

Floating foundations have been installed for turbines ranging from 2 to 8 MW in Scotland (Hywind Pilot Park) and Japan (Fukushima Demo Phases 1 and 2) and are in development in the United States at the pilot scale for the Aqua Ventus project in the Gulf of Maine (BOEM 2021). Figure 3.3-6 depicts the three primary floating foundation designs.

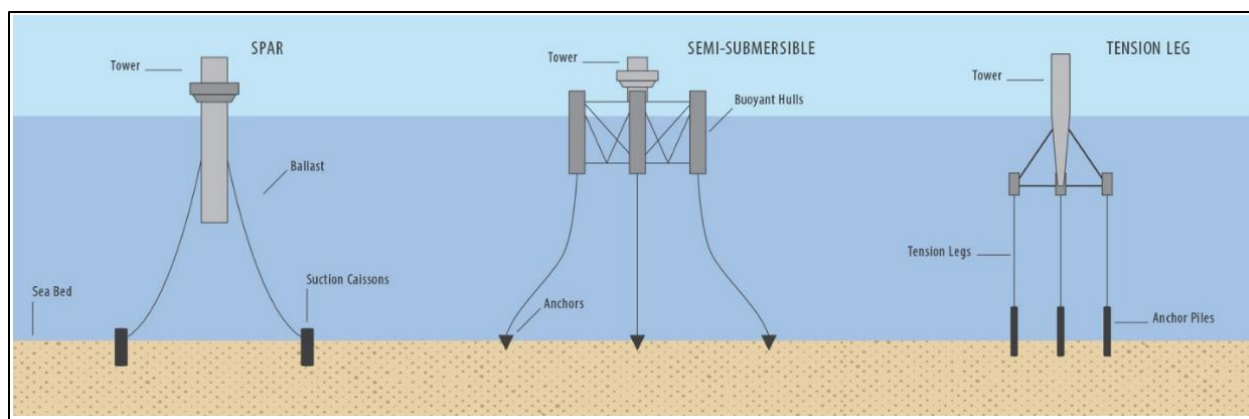


Figure 3.3-6. Floating foundations

Source: BOEM (2021)

3.3.3 Cables

3.3.3.1 Inter-Array Cables

The cables between adjacent wind turbines are relatively short in length and their alignment and connections depend on the OSW facility layout. The cables between the offshore substation and the wind turbine strings are typically longer. The development of large turbines means that inter-array cables typically operate at a voltage level between 33 kilovolts (kV) and 66 kV. Future designs that will support turbines 15 MW or greater will operate at 132 kV (Lewis 2024).

Figure 3.3-7 shows a typical cross section of a three-core cable with fiber optic communications medium. The steel wire outer armoring provides mechanical protection for the cable.

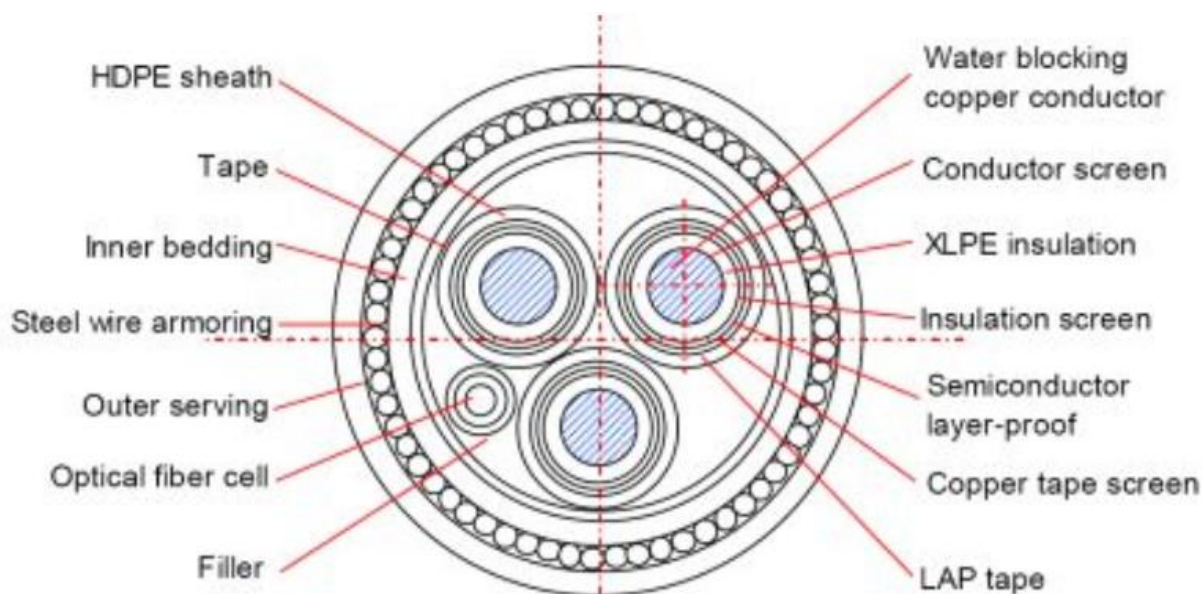


Figure 3.3-7. Cross section of inter-array cable

Source: BOEM (2016)

3.3.3.2 Export Cables

Export cables transmit electricity from offshore substations to a designated onshore landfall point for connection to networked grids. Two types of cables are currently available for use: Alternating Current (AC), including Extra High-Voltage AC or High-Voltage Direct Current (HVDC). Most AC export cables are less than 80 kilometers (km) in length to minimize transmission losses (Lewis 2024) and are similar to the array cables in that they are three-core cables.

AC transmission systems have a maximum capacity of 400 MW per cable, whereas HVDC systems generally operate in the range of 320 to 525 kV (Lewis 2024) and are able to support wind farms located further offshore. HVDC cables are much simpler, although in most cases two will be required: a send and a return (also referred to as positive and negative). The two HVDC cables are typically bundled together and installed in a single trench.

3.3.4 Turbines

This study focuses on wind turbines with power ratings ranging between 12 MW and 18 MW, which is the likely range of turbine sizes that would be principally used in the United States in the short- and medium-term, with 21-MW turbines considered for long-term applications. Figure 3.3-8 presents a typical OSW turbine. The primary components of an OSW turbine are labeled.

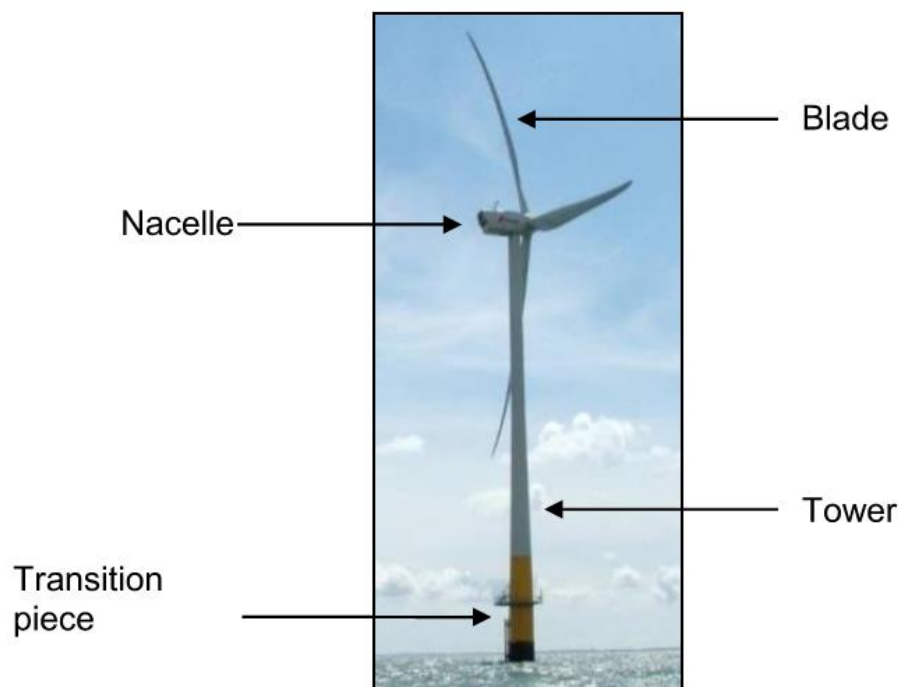


Figure 3.3-8. Principal components of an offshore wind turbine
Source: DNV GL (2014)

3.3.4.1 Wind Turbine Tower

The tower structure is usually a lightly tapering tubular section, which connects the flanged connection at the top of the foundation unit or transition piece to the nacelle. The tower structure is likely to consist of up to four tapering steel tubular sections, which are lifted into place and bolted together.

3.3.4.2 Nacelle and Blades

The nacelle typically houses the drive train and many of the power, electronic, and control components of the turbine. The general architecture of a typical gear-driven wind turbine nacelle is illustrated in Figure 3.3-9. The nacelle is usually installed at the site as a single unit, with the hub pre-installed. The wind turbine blades are then bolted onto the hub. Depending on the capabilities of the installation vessel and the assembly space available in the staging port, some turbines are erected using a full rotor installation, which consists of the hub and blades being preassembled onshore and installed on the nacelle offshore.

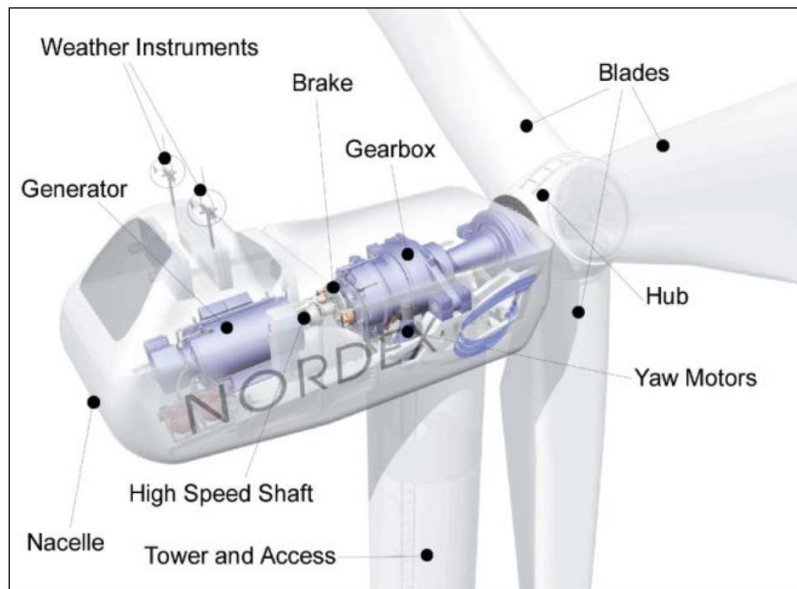


Figure 3.3-9. Wind turbine nacelle

Source: Nordex (<https://www.nordex-online.com/en/>) as cited in BOEM (2016)

3.3.5 Substations

Whether an OSW energy facility has an offshore or onshore substation depends primarily on the size of the wind farm, distance from shore, and distance from the grid connection point. Typically, wind farms further than approximately 6.2 miles (10 km) from land require offshore substations. The substation accommodates the transformers required to increase the distribution voltage (33 to 66 kV) of the inter-array cables to a higher voltage of typically 110 to 245 kV. From the offshore substation, export cables then carry the power to the landfall location.

As wind farm capacities increase and move farther offshore, there is a requirement for increased electrical equipment ratings and hence, for larger substations. When wind farms are located at substantial distances from shore, the losses in the electrical system can become significant. To minimize losses as far as possible, voltages are stepped up (e.g., from 33 kV to 320–525 kV).

3.3.5.1 Power Export Technology

Eventually, when distances are large, the transmission of electrical power with reasonable losses using High-Voltage AC (see Section 3.3.3.2) becomes technically challenging and may justify the use of HVDC technology, which is a step change in the size of the required electrical infrastructure. Figure 3.3-10 presents an approximation for the optimization of the power export technology as a function of the distance from the shore and the capacity of the wind farm.

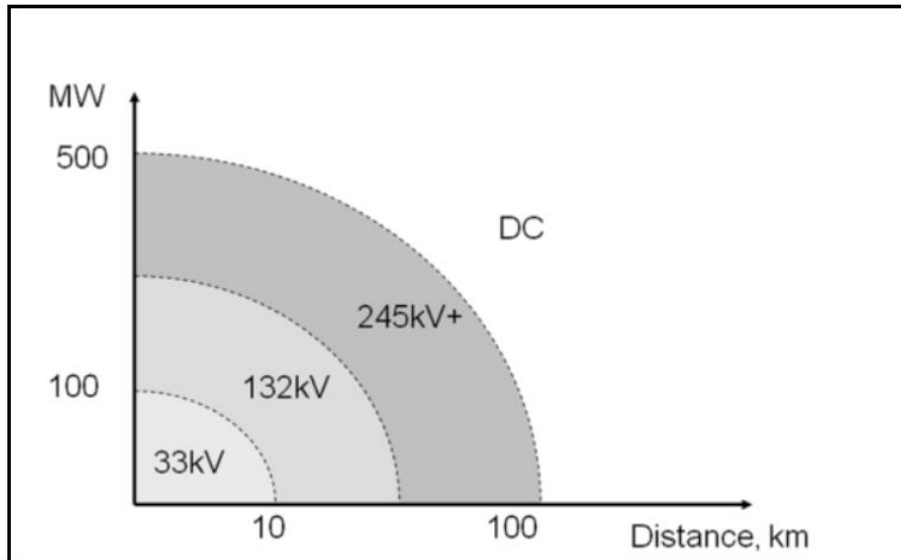


Figure 3.3-10. Export cable technology vs. distance

Source: DNV GL (2014)

If the power is to be exported from the wind farm using HVDC, a separate offshore platform may also be installed to house the plant, which converts the AC that is generated by the wind turbines to direct current for the transmission of power to shore.

The use of several substations for large projects and for projects with HVDC output is considered to be a likely trend as the OSW energy industry progresses and projects move farther offshore.

3.3.5.2 Substation Foundation

Substations require foundations on which to place the topside that contains the equipment mentioned above. Options for the foundation design are similar to those for turbine foundations but the topside weights are heavier, requiring significantly larger substation foundations.

The substation foundation unit is likely to use one of the design concepts described above for the wind turbines, most probably a jacket structure. Figure 3.3-11 shows typical configuration for a jacket-mounted offshore substation.

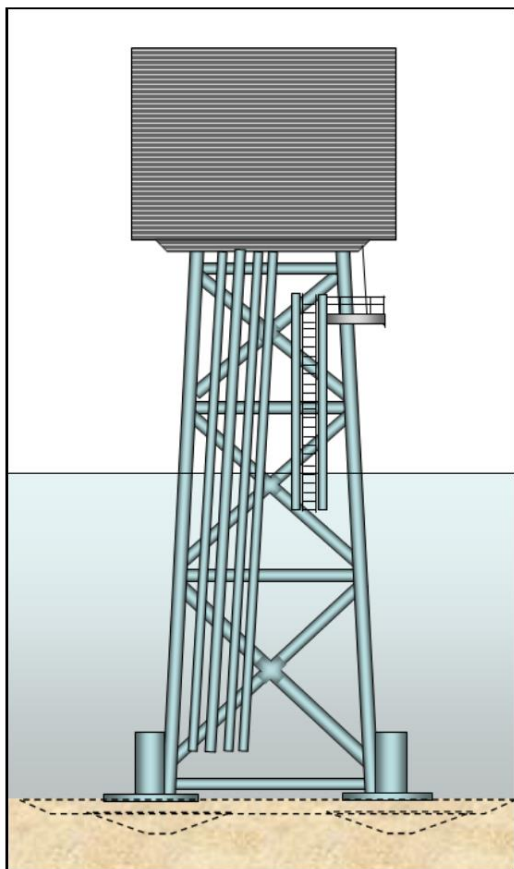


Figure 3.3-11. Offshore substation on jacket foundation

Source: DNV GL (2014)

3.4 Overview of Port Activities

Port facilities supporting OSW energy projects typically host three primary activities: manufacturing and fabrication, staging and installation, and O&M. Each of these potential port uses include a set of the following typical tasks performed at a port:

- Component loading and unloading
- Component transportation within the port
- Component storage and preparation

The following sub-sections provide a brief overview of each of these tasks. Additional general activities at ports also include the maintenance of components and final assembly prior to loadout.

Large OSW project components are generally manufactured, stored, loaded, and unloaded at a port facility before they are deployed to the project site. One exception is jacket foundations, which generally remain on their transportation barge after leaving the fabrication yard until they are installed.

Port facilities are therefore the best location for manufacturing and fabrication facilities. If a manufacturer happens to be located at a port reasonably close to the OSW project site, the port could potentially fulfill dual roles as both a manufacturing and fabrication port and a staging and installation port.

3.4.1 Component Loading and Unloading

Historically, wind turbines were manufactured for onshore installations. The remoteness of many onshore project sites was a key driver in determining maximum component sizes and their design for largely road-based transport. The international scale of the wind turbine market led to the location of many turbine manufacturers on or near coastal, river, or estuarine port facilities, placing them in a favorable position for the subsequent OSW market.

The increased size of offshore turbines can also restrict many traditional approaches to road-based component transport. As a result, it is normal practice for components to be transported in one of the following manners:

- Loading of components at the manufacturer's port facility and offloading them onto quayside storage areas at the staging port to be collected by a feeder vessel or installation vessel as required on-site;
- Loading of components onto a transport vessel or barge at the manufacturer's port facility and either anchoring the transport barge or offloading onto a storage barge in a sheltered harbor near the OSW project site while awaiting transfer to the installation vessel;
- Loading of components onto a transport vessel or barge at the manufacturer's port facility, and offloading onto the installation craft at the OSW project site – known as feeder vessel duties; or
- Loading of components directly onto the installation craft at the manufacturer's port facility for transport and installation at the OSW project site.

The loading of the vessels in ports can be performed in a variety of ways, but currently the most common approaches are the lifting or rolling of components onto the deck or into the holds of the transport vessel, using techniques known as “Lift-On, Lift-Off” (Lo/Lo) and “Roll-On, Roll-Off” (Ro/Ro), respectively. Both methods have significant implications, with regard to vessels and port infrastructure. The practicalities and implications of both techniques are briefly described in the following sections.

Other methods to load and unload components include rollers, grease and air skates, crawler transport units, and skidding techniques, which are generally less favored within the industry.

Due to their size and weight, GBSs are considered a separate case. There are four primary approaches to fabrication of GBSs: in a dry dock; in a floating dry dock; casting on a quayside; or casting on a barge.

In each of the first three cases, the GBS needs to be either lifted from a quayside or launched and floated to the offshore site. In Europe, HLVs are used to lift GBSs at the quayside. These vessels are being constructed in the United States and are expected to be available in the near- to medium-term. An alternate method for GBS fabrication and deployment is to cast them directly on the barge. An HLV will still be required to install the GBS at the offshore site.

3.4.1.1 Lift-On, Lift-Off

Lo/Lo has traditionally been the most common way to load and unload vessels, and commercial port facilities typically have cranes designed to accommodate the most common types of cargo passing through the port. Due to the size and weight of existing and proposed wind turbine components, it is important to note that existing cranes at many U.S. ports may not have the lifting capacity to meet the demands of the OSW energy industry.

Lifting operations within a port may be carried out either by land-based cranes, including fixed and mobile cranes on the quayside, or by the use of the vessel-mounted cranes, if present.

3.4.1.1.1 Quayside Cranes

The types of freight which are commonly loaded on and off vessels using cranes within port facilities vary widely and require very different lifting solutions:

- **Bulk and Granular Material:** Some bulk material cargos require cranes with grabber arms or pneumatic transport systems, while some vessels may have built-in internal hoppers and conveyor discharge systems. These types of arrangements are suitable for granular materials such as rocks, aggregates, grain, iron ore, traditional solid fuels (like coal), wood chips, and pellets for biomass heating systems. Cranes dedicated to this application tend to be highly specialized, with relatively light lift capacities but fast cycling capability (both hoist speeds and slew-rates). All but the largest of these, operating in tandem, would be unsuitable for lifting heavy turbine or foundation components, but may prove beneficial for loading or unloading rock, gravel, and grout materials during seabed preparation works, grouting works, and burial or scour-protection works.
- **Containerized Freight:** Most “transit” cargos pass inland through ports and are therefore packaged in such a way as to be suitable for forwarding as either road or rail freight. The most common example of these is container shipping, which has dedicated vessels and port cranes (Figure 3.4-1), most of which are generally inappropriate for OSW installation purposes due to their relatively light lift capabilities and “made to order” configuration.



Figure 3.4-1. Container port crane

Source: PortStrategy (<http://www.portstrategy.com/news101/port-operations/cargo-handling/gift-of-the-grab>) as cited in BOEM (2016)

- Specialist and Non-Containerized Break-Bulk Cargo:** Break-bulk cargo is cargo where the individual components require handling to load and unload. Typically located at ports serving large component fabricators, ship builders, or other heavy industries, large harbor or gantry cranes are generally the most appropriate permanent quayside cranes for the purposes of offshore heavy component loading and unloading. Ports that do not have such permanent specialist heavy-lift cranes may, however, utilize large mobile, crawler, or ringer cranes as long as sufficient quayside ground bearing capacity strength exists (or can be constructed) (see Figure 3.4-2 for an example). One valuable feature of a crawler crane, as opposed to mobile or ringer cranes, is its ability to pick a load up and to track forward, thereby transporting the load while suspended, an operation which is called “pick and carry.” This enables the use of a single crawler crane both to load and to transport turbine components around a marshaling yard and avoids the additional expense of transporters such as Self-Propelled Modular Transport Units (SPMTs). The cost penalty is that the transit speed of a laden crawler crane is extremely slow; therefore, the time requirement for chartering delivery vessels, and any associated equipment and personnel, will be greatly increased, but it may be cost effective if pick and carry travel distances can be kept to a minimum.

Many areas adjacent to quays have had rails fitted for tower or gantry cranes (Figure 3.4-3). Generally, these cranes are too small to meet the requirements of OSW installation, but the reinforced concrete beams along which the rails run are often well supported by piles and may well have useful load bearing capacity, either for lifting or as haulage routes.



Figure 3.4-2. Mobile harbor crane

Source: Port of Vancouver USA (<http://www.portvanusa.com/news/imagelibrary>) as cited in BOEM (2016)



Figure 3.4-3. Gantry crane

Source: BOEM (2016)

3.4.1.1.2 Vessel Cranes

Another common solution to loading and unloading wind turbine components in port is to use onboard vessel cranes. This type of vessel with its own lift-gear is variously called a WTIV or an HLV. This option requires adequate onshore transportation facilities (such as SPMTs) and quayside bearing strengths to allow components to be located close enough to the vessel to be within the vessel-mounted crane’s operating radius.

Vessel cranes are not limited to WTIVs but may also be present on large cargo vessels that are used to transport components between manufacturers and staging and installation ports. Figure 3.4-4 shows a WTIV vessel used for the transportation and installation of turbines and foundations. As with other cranes, these vessel-mounted cranes may be used in tandem to increase the overall lifting capacity.

3.4.1.2 Roll-On, Roll-Off

Ro/Ro is most commonly associated with passenger car ferries and the transport of vehicles to their port of entry, where vehicles and other wheeled equipment are loaded and unloaded onto the vessel by driving them on and off the vessels using built-in Ro/Ro ramps directly from the quayside.

To determine whether a particular link-span (i.e., the ramp for loading/unloading components using Ro/Ro methods) can be used with a particular barge or vessel, a site-specific study by a specialist project cargo freight-forwarding specialist would be required.

Some ports that do not have permanent Ro/Ro berths can accommodate this method by using a mobile Ro/Ro ramp or may have berths suitable for use by a vessel with a built-in ramp. Mobile ramps are designed to be port-specific and enable an extension of a port's capability beyond that of its fixed infrastructure.

There are some general cargo vessels and heavy-lift cargo vessels that have aft or bow ramps designed for Ro/Ro cargos. Some vessels are designed with reinforced decks and will only accommodate the Ro/Ro cargos as deck loads, while others have more elaborate arrangements for accommodating the cargo below deck. An example of a Ro/Ro capable vessel is shown in Figure 3.4-5.

The number of Ro/Ro berths, and the category of cargo they are capable of carrying, are important factors to consider in evaluating port capabilities.

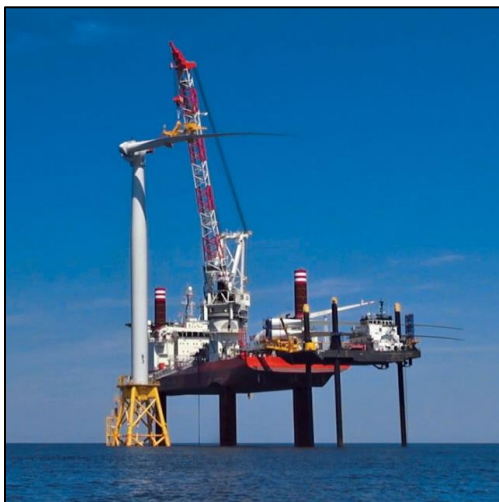


Figure 3.4-4. Pedestal crane on wind turbine installation vessel
Source: BOEM (2020)



Figure 3.4-5. Ro/Ro capable vessel
Source: Roll Group (www.roll-group.com/projects/windmill-equipment.html) as cited in BOEM (2016)

3.4.2 Component Transportation Within the Port

Components are transported within the port facility using a number of different techniques. This section briefly summarizes the primary techniques employed currently.

3.4.2.1 Crawler and Mobile Cranes

In general, the types of cranes currently found in ports are designed to meet the specific requirements of loading and unloading “general cargo” from vessels. Crawler cranes can be used in versatile roles, not only for loading and unloading components but also transporting items from storage around the port (see also Section 3.4.1.1.1). This can minimize the requirement for SPMTs, although these can prove to be significantly more economical than using a crawler crane of suitable specifications for all operations.

Crawler cranes typically have cabs located at a high level, to allow the crane driver to see into deep holds easily. They also have relatively low lift capacity but high operational cycle times and can quickly perform small lifts to load vessels. Crawler cranes currently in operation at U.S. ports have lifting capacities that range from approximately 200 to 300 tons (181 to 272 mt).



Figure 3.4-6. Typical lattice-boomed crawler crane

Source: BOEM (2025)

It is possible to use crawler cranes in tandem to load large or heavy components aboard a vessel at a distance. An alternative option to the lattice-boomed crawler crane is a mobile crane. These are generally self-transporting and can mobilize quickly. This means that the crane can be brought to and from the site in short order, allowing the contractor to minimize the number of days the crane is sitting idle on-site. While day rates for mobile cranes are significantly higher than those for crawler cranes on long-term hire, this could work out to be less costly over the project duration and should be considered by project developers.

A mobile crane stabilizes itself with a set of out-rigger legs, generally four. One disadvantage is that these out-rigger legs concentrate load weights into relatively small surface areas, which is inadvisable immediately adjacent to a quayside edge. This condition is known as “super-loading.” Most quaysides are constructed from sheet-pile walls with a concrete capping beam, and there is a significant danger of the sheet piling failing if large surcharge loads are placed too close to the edge.

Another disadvantage of mobile cranes is that they cannot “pick and carry,” as described above, and can only rotate and place a lifted load within its safe operating radius. This means that SPMTs will also likely be required to transport components to storage, incurring additional daily costs.

3.4.2.2 Self-Propelled Modular Transporter

Some ports have managed to avoid the need for heavy cranes by loading turbines and foundation components onto SPMTs and transferring them to Ro/Ro ship-type vessels or transport barges loaded using Ro/Ro methods. Common forms of SPMT have individual two-axle units with a load carrying maximum capability of approximately 60 tons per axle (54 mt per axle) and can be arranged side-by-side or end-to-end in a rolling transporter for extremely large loads (Figure 3.4-7).



Figure 3.4-7. Self-propelled modular transporter

Source: DNV GL (2014)

Whether this type of loading or unloading arrangement will be possible is specific to each port facility and vessel combination, as relatively gentle ground surface gradients, large turning radii, and sufficient headroom are required (and are often not available in existing port Ro/Ro facilities). Any usage of incorporated roads would require that transportation complies with road haulage regulations for that part of the haulage route.

Specialist heavy transport firms, or project cargo forwarders, can support companies wishing to investigate the suitability of individual port facilities for accepting specific cargos. However, each combination of vessel, port, and component will require individual assessment. If large numbers of components require storage, further assessment of the deck strengths or axle loads of haul routes between the Ro/Ro offloading and storage areas will also be required.

Despite the complexities of this transport method, it avoids the need for large cranes, which can result in significant savings. Additional cost may be incurred due to the need for storage frames or equivalent, which allows SPMTs to roll underneath and jack the load on and off.

3.4.3 Component Storage and Preparation

Wind turbine components are large structures, which require significant storage space at ports.

During storage, components are raised off the ground, as shown in Figure 3.4-8. This enables SPMTs to maneuver underneath, jack up to take the weight of the component, and transit to the quayside for loadout to a vessel or barge. A sufficient gap must therefore be left for the SPMT beneath the component. Typical methods to achieve this are the use of short metal columns or baulk timbers to raise the component off the surface and distribute the load across the ground.



Figure 3.4-8. Blade storage in a port

Source: NREL (2025)

Generally, to save space, blades are stored in stacks of two or three with frames supported by metal columns or blocks at both ends. For nacelle storage, four columns are generally used to support the structure. The nacelle would rest on timbers placed at the midpoint of the nacelle. Transition pieces are generally also stored on metal frames, which rest on four columns. The weight is then distributed over two pieces of baulk timber as long as the diameter of the transition piece.

Monopile foundations are generally stored on columns placed at specific points along the foundation component with each column resting on a long piece of baulk timber. Jacket foundations are generally stored upright or resting on their sides, with each of the contact points resting on wooden pallets or baulk timbers. However, as noted previously, it is not recommended for jacket foundations to be stored at the staging port, but rather loaded immediately onto a barge from the manufacturing port or facility and kept there until ready for installation. Due to the bracing elements, jacket foundations are particularly fragile, and this method avoids double handling and potential damage.

Numerous components will be delivered to the staging port from manufacturing sites in the United States, Europe, and Asia and long transit times will likely result in a requirement to store more components at the staging port in order to provide sufficient buffer during construction. As a result, U.S. ports will likely need larger storage areas than are common in European staging ports.

3.4.4 Potential Activities and Use Conflicts

Ports that offer the ability to accommodate the activities associated with OSW also host a variety of other activities that can aid, conflict, or occur simultaneously with uses related to OSW facility development. The activities that are already established at these Atlantic coast ports can affect OSW uses both directly and inadvertently (and both positively and negatively) due to the logistics, infrastructure, and benefits of the activity. An example of a positive direct effect is that a port may already have the road systems in place to handle large freight trucks. An example of an inadvertent negative effect is that a port authority may prefer to maintain established relationships with industries they are currently serving on a consistent basis and be hesitant to embrace change for what may be considered intermittent or project-specific activities. It is common practice for an OSW project to lease an entire port or at least an entire terminal,

which can serve to minimize vessel conflicts and interference with onshore activities. Below are the major activities and uses currently found at potential OSW ports along the Atlantic coast:

- **Shipping** – U.S. waterborne cargo and associated activities contribute over \$500 billion annually, sustaining 10 million jobs (USDOT 2018). Vessels involved in the shipping industry range from 100 feet (30.5 m) to over 1,000 feet (305 m) in length and utilize ports daily.
- **Commercial Fishing** – the U.S. commercial fishing industry is a \$5.5 billion industry (NOAA 2019) typically utilizing vessels 30 to 100 feet (9 to 30 m) in length. Commercial activities occur on a daily basis involving on- and offshore logistics.
- **Cruise Lines** – the worldwide cruise industry is a \$138 billion industry (Cruise Lines International Association 2024) utilizing large vessels that may exceed 1,000 feet (305 m) in length. Cruise ships typically do not visit ports on a daily basis and visit northern U.S. Atlantic coast ports more regularly in warmer months.
- **Recreational Boating** – the recreational boating industry contributes approximately \$230 billion annually (National Marine Manufacturers Association 2024). While recreational boaters often navigate the same waterways as large commercial vessels, in most cases, marinas for recreational vessels are not located directly adjacent to port facilities.
- Other activities are conducted by the U.S. Coast Guard, U.S. Navy, passenger ferry services, and marine tourism (i.e., whale watching and scenic tours).

Table 3.4-1 below compares aspects of current marine industries in ports along the Atlantic coast and how their specialized infrastructure could possibly complement or conflict with the requirements needed to build the OSW energy infrastructure.

Table 3.4-1. Summary of potential activities and use conflicts with offshore wind

Industry	Potential Complements with Offshore Wind Port Use	Potential Conflicts with Offshore Wind Port Use
Commercial Shipping	· Due to the current and planned size of shipping vessels, ports that handle commercial shipping often meet the requirements to handle large vessels and can handle the barges and vessels used for OSW construction. · Existing upland infrastructure, including warehouses, lifting equipment (cranes), road and rail infrastructure, and quays are often already in place to handle most requirements for OSW construction. · Areas adjacent to and surrounding large commercial ports are accustomed to the impacts associated with commercial shipping (e.g., noise, odor, visual impacts). · Tug and towboat services are already established. · Existing federally maintained navigation channels already meet required depths and widths for OSW construction. · Proposed port modifications associated with OSW development may open new opportunities for a port's commercial shipping uses. · Safety, security, and communications networks are typically already established at most commercial shipping ports.	· Commercial shipping is a reliable source of revenue for ports, and ports may not accept the potential economic risk involved with pivoting to a new industry with an uncertain future that could conflict with existing uses. · Existing operations may be negatively impacted while required port modifications to support OSW construction are being undertaken. · Port schedules are typically inflexible and delays, which may occur more frequently during OSW construction, have significant cost implications. · Commercial cargo ports prefer long-term contracts and OSW project construction typically requires port use for 2 to 3 years.

Industry	Potential Complements with Offshore Wind Port Use	Potential Conflicts with Offshore Wind Port Use
Commercial Fishing	· Existing road or rail infrastructure, or both, is typically in place to support commercial fishing freight. · Most commercial fishing vessels are smaller in size than those used to support OSW construction and O&M activities and possess adequate maneuverability to avoid vessel traffic impacts. · Commercial fishing vessels often do not operate on a fixed schedule. · Safety, security, and communications networks are typically already established at most commercial fishing ports. · Land-side operations are significantly smaller in scale than OSW construction activities with little to no overlap between industries; however, required infrastructure (cranes, large warehouse facilities) may not exist.	· Commercial fishing vessels operate year-round and typically on a daily basis which cause vessel traffic impacts without adequate coordination. ·
Cruise Lines	· Ports able to handle large cruise lines typically have adequate infrastructure and capabilities (e.g., quayside ground bearing capacities or cranes) that may meet requirements for OSW construction. · Proposed port modifications associated with OSW development may open new opportunities for a port's cruise line uses. · Cruise ships operation on fixed schedules, known well in advances, which can limit vessel traffic impacts.	· Cruise vessels and their associated security perimeters may limit other port uses on-water and in upland areas. · Land-side operations and port features for servicing cruise lines are typically different from those required to support OSW construction. · Warm-weather construction windows for offshore development coincides with the highest level of cruise ship activity.
Recreational Boating	· Small recreational or fishing ports can potentially provide adequate docking space for small vessels for OSW O&M activities, which could provide additional revenue to the port. · Port industries are accustomed to the recreational boating community and any additional vessels for O&M activities may not negatively impact other port activities. · Recreational vessels do not operate on fixed schedules. · Powered recreational vessels have maneuverability to avoid vessel traffic impacts.	· Sailboats have limited maneuverability and may cause vessel traffic impacts while under sail power. · During summer months, the number of recreational boaters increases and may cause vessel traffic impacts. · Many recreational boaters do not have an understanding of basic navigational rules, which could lead to conflicts.
Other	· Ports with U.S. Navy or U.S. Coast Guard installations will have harbors free of ice and obstructions year-round and will likely have adequate harbor and channel depths. · Ports with ferry services typically only operate during warmer months of the year.	· Large U.S. Navy or U.S. Coast Guard vessels may cause vessel traffic impacts. · U.S. Navy or U.S. Coast Guard security perimeters may hamper or preclude use of some portions of harbors and port facilities. · Ferries operate on fixed schedules and may cause vessel traffic conflicts. · The presence of large vessels used for OSW activities may attract increased attention or sightseeing, resulting in vessel traffic impacts.

Additional concerns for ports that are not directly associated with other industries along the Atlantic coast include hurricane barriers that limit vessel sizes (e.g., New Bedford, Massachusetts), availability of heavy-lift cranes, and adequate quayside bearing limits to support heavy-lift cranes, whether mobile or

fixed. OSW port modifications that may require in-water work, either quayside or in-harbor channel deepening, would have the greatest potential to impact the existing port uses described above.

While there is the potential for conflict between vessels engaged in routine waterborne commerce and those engaged in the OSW energy industry activities, these types of potential conflicts are well managed and minimized by the marine industry and the U.S. Coast Guard. As part of its mission, the U.S. Coast Guard routinely de-conflicts waterways to maintain marine safety and to allow marine construction activities, specialized vessels, and routine vessel traffic to operate in the same waters with minimal disruption. In addition, professional mariners routinely maintain radio contact with one another when operating close to each other so each vessel's intentions are known, and conflicts can be minimized or avoided.

3.5 Summary of Port Requirements to Support Offshore Wind

Port requirements specific to OSW energy are addressed in the remainder of this section. Overall, the size and weight of OSW turbine components makes the ports that support these projects relatively unique when compared with the typical existing U.S. port.

The seven primary factors for ports handling OSW components are:

1. Access
 - a. Port access channel width
 - b. Port access maintained and controlling water depths
 - c. Overhead draft (i.e., bridge clearance, port crane heights)—also known as “air draft”
 - d. Number of berths
2. Quayside characteristics
 - a. Length of the quayside
 - b. Bearing capacity of the quayside
 - c. Bearing capacity of the seabed at the quayside
3. Storage
 - a. Size of storage area
 - b. Bearing capacity of the haul route(s) between the quayside and storage area(s)
 - c. Bearing capacity of the storage area(s)
4. Ro/Ro capability
 - a. Width and headroom of Ro/Ro berth
 - b. Bearing capacity of Ro/Ro berth and ramps
5. Cranes
 - a. On-site crane capabilities
 - b. Crane height restrictions
6. Transportation infrastructure
 - a. On-site rail
7. Location
 - a. Vessel transit distance to OSW project sites
 - b. Availability of skilled workforce

The majority of this section discusses staging and installation ports. However, manufacturing and fabrication ports along with O&M ports are also briefly discussed.

3.5.1 Manufacturing and Fabrication Ports

Ports that house manufacturing and fabrication facilities will have requirements specific to those activities. The following considerations apply when developing these ports.

- **Vessel access:** Ports that support manufacturing activities for turbine components, foundations, cable, etc., share the same vessel access requirements as staging ports, since components are often transported from the manufacturing facility to the staging port.
- **Specific requirements for manufacturing and fabrication:** Manufacturing ports may have specific requirements based on the needs of the manufacturer, such as covered warehouse space, overhead cranes, rail access, heavy lift capacity, or indoor and outdoor storage.
- **Lifting capabilities:** It is expected that ports where the heavier components, such as nacelle and foundations, are handled will need ground improvements to strengthen bearing capacities to be able to handle the weight of these components and may require swept path analysis on bend radii of haul routes to be considered.
- **Specialized vessels:** If special vessels are required to load or unload a component, the manufacturing port must also be able to accommodate these vessels. Examples include jack-up vessels for transporting nacelles, heavy-lift crane vessels for lifting foundations, WTIVs, and cable laying vessels.
- **Location:** Manufacturing ports do not need to be located near the OSW project site; they are instead typically located based on economic and business reasons, such as access to skilled work force and transportation infrastructure.

3.5.2 Staging and Installation Ports

As noted in Section 3.2.2, the most common approach for constructing an OSW energy project is to identify a staging port in close proximity to the offshore site, and then to transport all major components from the manufacturer's facility to that port. The use of staging ports is common practice in Europe and is expected to be the practice in the United States for the foreseeable future. Because staging and installation ports are the most common approach for wind farm construction, the focus of planned port buildouts that have been identified on the Atlantic coast are generally related to staging and installation ports. In addition, modifications related to developing staging ports are also generally applicable to manufacturing and fabrication ports, and O&M activities do not typically require significant modifications; therefore, the focus of this study is on identifying modifications for planned staging and installation ports.

The following sections describe the port requirements and important characteristics for specific components and types of port activities necessary to support OSW energy projects. Table 3.5-1 provides some examples of the characteristics that generally represent typical minimum requirements.

Table 3.5-1. Example of minimum requirements to support offshore wind projects

Requirements	Units	Blades	Nacelles	Towers	Foundations
Port access channel width	feet	75	100	75	360
Port access channel depth	feet	30	30	40	40
Overhead clearance	feet	115	150	Unlimited	Unlimited
Number of berths	no.	2	2	2	2
Quayside bearing capacity	metric tons per square meter (mt/m ²)	5	10	10	15–30
Quayside length	feet	500	500	1000	1000
Quayside width	feet	200	200	200	300
Quayside depth	feet	30	30	40	40
Quayside seabed suitable for spud-jacking	Y/N	N	N	N	Y
Haul route bearing capacity	mt/m ²	5	10	10	15–30
Storage area bearing capacity	mt/m ²	5	10	10	15–30
Size of storage area	acres	6	6	10	30
Ro/Ro capability	Y/N	Y	Y	Y	Y
Ro/Ro ramp width	feet	16	150	150	150
Ro/Ro ramp bearing capacity	mt/m ²	5	10	10	15–30
On-site crane lifting capacity	mt	700	700	700	1000
On-site crane height restrictions	feet	400	400	Unlimited	Unlimited
Transportation infrastructure (presence of on-site rail)	Y/N	Y	Y	Y	Y

Note: “Unlimited” indicates that a component cannot realistically be moved under any structures or overhead utilities and therefore requires unlimited headroom.

When assessing a port for its potential to support an OSW energy project, a facility that does not meet the minimum requirements for a characteristic listed in Table 3.5-1 may still prove to be the preferred option for a given project due to other advantages of the port. If project engineers and designers are encouraged to consider adopting reasonable alternative transportation or installation strategies during the front-end engineering design study phase, port facilities with capabilities below the specified minimum requirements can be still viable for some OSW construction or O&M activities with minimal improvements or modifications required; this may come at the expense of operational efficiency and potentially construction timelines, or with the requirement of modifying and using multiple sites. Site-specific cost-benefit analyses should be carried out between utilizing alternative means and methods in existing infrastructure, versus adopting “non-transferrable” construction strategies that require capital investment to enhance port infrastructure to meet all required criteria. In other words, developers must determine whether the cost of modifying a port is outweighed by the benefits in time and cost achieved by basing construction out of a single port that meets all requirements.

3.5.2.1 Requirements by Component

The following sections address specific port characteristics required to accommodate storage, assembly, or loading and unloading of different types of OSW energy project components.

3.5.2.1.1 Wind Turbines

If the turbine is assembled in a port, a crane capable of lifting the heavy nacelle and rotor to hub height will be required. One or more cranes operating in tandem can be used for this operation. For a large wind

project that requires assembly or final assembly of the turbines in port, sufficient quayside space and berth space will also be required.

3.5.2.1.2 Blades

Wind turbine blades are long and require specialized rigging to load and unload, but at 60 to 85 tons (54 to 77 mt) are sometimes within the typical weight limits of other break-bulk cargo handled at U.S. ports. As such, the bearing capacities of the quayside and storage areas of typical U.S. ports are often sufficient to support these components without modifications. The size of the blades requires the port to have sufficient space on the quayside during loading and unloading of transportation and installation vessels. In the storage area, the blades can usually be stacked two or three units tall, which minimizes the storage area required. Haul routes between storage and loadout quays must have gentle gradients and bend radii to allow the haulage to pass freely.

Ro/Ro loading and unloading is a viable option for blades.

3.5.2.1.3 Nacelles

Offshore turbine nacelles can weigh 730 to 1,200 tons (662 to 1,088 mt) and are heavier than typical break-bulk cargo. Therefore, 10 metric tons per square meter (mt/m^2) (2,048 pounds per square foot [psf]) is the recommended minimum bearing capacity in areas used to support nacelles. Improvements to ground bearing capacities of the quayside, haul routes, and storage areas at U.S. ports is anticipated to be required to meet these minimum requirements. If a heavy-lift crane is used to load and unload the nacelles from the transportation vessel, the quayside will need to be strengthened to support these lifts since such lifts can impart point loads from the cargo or the counterweights under the front or back of the crane footings and outriggers. Transportation within the port is typically accomplished using SPMTs to distribute the weight.

Turbine suppliers may require the use of jack-up vessels at the quayside when loading or unloading nacelles. This means that the bearing capacity of the seabed at the quayside must be capable of supporting a jack-up vessel. Consistent with the 2016 Study, this study has also concluded that most U.S. ports do not currently meet this requirement and would require modifications to support these vessels.

Ro/Ro loading and unloading is also a viable option for nacelles.

3.5.2.1.4 Towers

Towers for OSW turbines can range in weight from 150 to 350 tons (136 to 317 mt). Therefore, 10 metric tons per square meter (mt/m^2) (2,048 psf) is also the recommended minimum bearing capacity for the quayside, haul routes, and storage areas to support towers. Improvements to ground bearing capacities at the quayside, haul routes, and storage area can be expected to be required at U.S. ports to load, unload, transport, and store these components.

Ro/Ro loading and unloading is a viable option for towers.

3.5.2.1.5 Foundations

OSW turbine foundations are much heavier than most other cargo stored or staged at U.S. ports. As a result, specific load-spreading provisions and ground strength modifications must be made to accommodate these components.

3.5.2.1.6 Monopiles

Monopiles can weigh in the range of 1,100 to 3,300 tons (1,000 to 3,500 mt) or more. As a result, ground bearing strength improvements will often be required at U.S. ports to handle this type of cargo at the quayside, along the haul routes, and in the storage area. Ground bearing capacities on the order of 15 to 30 mt/m² (3,072 to 6,144 psf) are recommended, although this can be reduced if additional load spreading is utilized (e.g., additional axles on the SPMTs). It is expected that additional lifting capacity (e.g., multiple cranes operating in tandem) will be required to load and unload these components as these weights are beyond the capacities of typical existing harbor cranes. Monopiles are typically transported within the port using SPMTs.

Transition pieces weigh approximately half of what a monopile weighs and are typically transported and stored vertically using cranes or horizontally by SPMTs (prior to equipment fit out). Ideally, they should be stored adjacent to quaysides, to minimize transport distances.

3.5.2.1.7 Gravity Base Structures

GBS foundations are the heaviest OSW component, weighing between 1,500 and 4,500 tons (1,360 to 4,082 mt), and heavier GBSs are expected to be developed in the future. Therefore, 15 to 30 mt/m² (3,072 to 6,144 psf) is also the recommended minimum bearing capacity to support GBS foundations, especially if transportation within the port is required. If GBSs are to be fabricated on the quayside, the quayside will most likely need to undergo significant ground bearing strength improvements to be able to support this weight.

Other options for GBS fabrication are in a dry dock facility and on a barge. GBSs built in a dry dock would be buoyant and would be floated and towed to site. The dry dock needs to be wide enough to support the full GBS diameter plus a buffer; 150 to 200 feet (45 to 60 m) width is recommended, but this will depend on the specific GBS design. Similarly, the barge would need to be of sufficient size to accommodate the GBS and supporting fixtures and activities. The port will likely need to be able to support multiple GBS construction barges simultaneously, so the quayside length and number of berths become important.

A tower crane is often used during the construction of large GBS foundations and has its own ground bearing strength requirements. SPMTs can be used to transport GBSs within the port. If SPMTs are used to deliver the GBS to the quayside for loadout, additional reinforcement of the quayside will be required.

Lifting of GBS structures in Europe is done using HLVs such as WTIVs. These vessels have limited availability in the United States, so construction on a barge is still the most likely scenario. The size of the required barge will dictate the required harbor channel width and depth. Overhead clearance will need to accommodate the full height of the GBS and the barge. If construction is done on barges, the installation vessel is not required to interact with the port.

3.5.2.1.8 Jackets

Jacket structures for OSW turbines are typically manufactured and delivered directly to the wind farm site using deck barges. If storage at a staging port is required, transport is typically done using barges with the jackets oriented vertically. The overhead clearance will be determined by the height of the jacket. In general, it is recommended that ports with unrestricted headroom be considered for handling jackets.

Based on their weight, which is estimated to be 500 to 2,000 tons (453 to 1814 mt), port facilities accommodating jackets will require ground improvements to achieve a bearing capacity on the order of 15 to 30 mt/m² (3,072 to 6,144 psf). The actual bearing capacity required will depend on the type of lifting equipment used, the type of transportation available, and the load-spreading techniques used.

Alternatively, jackets can be stored on barges in the harbor, provided that sufficient harbor storage area is available.

3.5.2.1.9 Suction Buckets

Like the other types of foundations described herein, suction bucket foundations will exceed the weight thresholds of most U.S. ports. As a result, ground improvements will be required at the quayside, along the haul route, and in the storage area, and additional lifting capacity at the quayside will likely be required.

Suction buckets can be fitted to both monopile and jacket foundation systems, and while the latter will require similar logistics to piled jackets, suction buckets on monopiles will need modified transport frames on SPMTs and greatly increased headroom over their conventional counterparts.

3.5.2.1.10 Floating Foundations

Floating foundations will likely be deployed from a staging port and have specific requirements for the staging port facility. If the turbine is fully integrated on the foundation in the port, either in a dry dock or at the quayside, then towed to the project site, the port will need to have unlimited overhead clearance both within the port and along the access channels to the sea to accommodate the tower and rotor. Water depth is not anticipated to be a driving factor in the harbor as the floating foundations currently in development all have the ability to add buoyancy and float higher in the water during construction and transportation.

Wet storage is another criterion critical to port operations for floating wind. Wet storage is for assembled floating foundations that are temporarily staged prior to towing out to the offshore site. Wet storage was not evaluated in this study due to the limited availability of required water depths adjacent to U.S. Atlantic coast ports as well as the lack of floating foundation projects currently planned for the Atlantic coast. Wet storage areas will require large available areas of water with adequate depths that are protected from damage from wind and waves during storage. Potential wet storage areas would be identified following selection of a port for use to support an offshore floating foundation project installation.

3.5.2.1.11 Cable

It is common for inter-array (collection) cables to be transported individually on cable reels and stored at a staging port. The export (transmission) cables are more likely to be delivered directly from the cable supplier to the project site. To accommodate reels (or drums) of inter-array cables, the port must have the ability to lift the fully loaded reels onto the quayside. This typically requires a heavy-lift crane. Alternatively, the vessel crane may be able to complete this task if it is of sufficient capacity. Sufficient storage space is required to house the cable drums.

As described above, there is also a requirement to store spare lengths of inter-array and export cables in port facilities should cable repair become necessary. This long-term storage typically takes place in drums or carousels that are placed in an area where the cable can be transferred to the cable repair vessel when needed.

Ground bearing capacity improvements to support cable storage during installation or for long-term spare cable storage are less likely to be needed in U.S. ports since the weights of the loaded drums and reels would be within the range of the weights of cargo typically handled at U.S. ports. Some port modifications may be required on a case-by-case basis to support this use.

3.5.2.1.12 Substations

Substation foundations are assumed to be similar to the wind turbine foundations for the project (e.g., a jacket foundation). As such, the same storage and handling requirements described above apply to this foundation.

Substation topsides are extremely heavy items and as such tend to require similar port capacities as GBS foundations due to their size and weight. Due to the difficulty of handling large substations, they will typically be installed directly from the manufacturing or fabrication port. If the substation topside is stored at the port, the quayside will need to have sufficient bearing capacity to carry the weight. If the substation topside is offloaded at the port, it is expected to be stored on a specially reinforced section of quayside to await deployment to the project site; topsides are unlikely to be transported or stored elsewhere in the port due to their size and weight. A heavy-lift crane would be required on the quayside to load the topside onto the transportation vessel. The quayside will likely need to be strengthened to accommodate this lift.

3.5.2.2 Requirements by Activity

The following sections address specific port characteristics required to accommodate the primary activities conducted in staging and installation ports during the construction of an OSW energy project. As indicated above, the weight of the various components is a critical factor that needs to be accounted for in each of the activities addressed below.

3.5.2.2.1 Loading and Unloading

The loading and unloading of components require sufficient berth space, crane capacity, and area on or adjacent to the quayside to temporarily store the components. This quayside and storage area must have sufficient ground bearing strength to accommodate the components. When nacelles are loaded or unloaded, the turbine supplier may require that the vessel be jacked up at the quayside. This means that the bearing capacity of the seabed at the quayside must also be capable of supporting a jack-up vessel. Similar to the conclusions of the 2016 Study, it was determined through information gathering and discussions with port operators that the U.S. ports surveyed do not have readily available information on the bearing capacity of the seabed, and that ports would need site-specific studies to determine the bearing capacity of the existing seabed.

A staging port during project construction is a busy place, with vessels coming and going at various times. The port needs to be large enough to support this level of vessel activity without constraint to the OSW staging operation or any other activities in the port (an OSW project would typically utilize the entire quayside area and thus minimize interference to and with other port activities). Similarly, vessels would ideally have unrestricted access to the project site, meaning that no bridges or locks exist between the port and open ocean, and the access channel needs to be of sufficient width and depth to allow vessels to transit.

Given the number of vessel trips required to transit to and from the project site, the staging port would ideally be located close to the offshore project site. While this is not essential, transit distance to site is a significant factor in the cost of construction and operation, as well as vessel access to the port.

3.5.2.2.2 Transport and Lifting In Port

Transport within the port is assumed to be done using SPMTs, which allows the bearing pressure of the component to be limited. For foundations, the recommended bearing capacity is 30 mt/m² (6,144 psf), while for turbine components, the recommended value is 10 mt/m² (2,048 psf). Ports with bearing

capacities greater than these recommendations will have additional transportation options available, such as the use of crawler cranes.

Lifting of components requires a land-based crane or the use of the vessel-mounted crane. For heavy components such as nacelles and foundations, the specific crane lifting plan and locations will need to be engineered such that the distributed and point loads are accommodated. Different options exist for accomplishing the load-spreading required during lifting, including modifications (e.g., soil compaction, subsurface pile installation, placement of dense graded aggregate, increased pavement/quayside concrete deck thickness) to provide sufficient ground bearing capacity over the entire quayside or storage area, and the use of “hard points.” Hard points are small areas that are strengthened, such as where cranes are positioned or mounted.

3.5.2.2.3 Component Preparation

Final assembly of components may be performed in port. The key considerations for this type of activity are the overhead clearance for any cranes required for the work, ground bearing capacity to support the required transportation and lifting activities, availability of work space with sufficient buffer to complete the assembly safely, and power and other auxiliary services required to complete the work.

3.5.2.2.4 Storage

Storage of components requires sufficient area to store the components, sufficient ground strength and load spreading (e.g., cribbing) to distribute the weight of the component, security at the site, and auxiliary services (e.g., power) to provide any periodic maintenance required by a given component. For ground bearing capacity, a minimum of 10 mt/m² (2,048 psf) is the recommended threshold for turbine components and 30 mt/m² (6,144 psf) for foundations.

3.5.3 Operations and Maintenance Ports

O&M ports are generally ports within a reasonable distance from the offshore project location. Based on the results of the 2016 Study, it was determined that most U.S. ports fulfill the requirements for O&M ports with their existing capabilities and with little or no upgrades required. Some considerations relative to O&M ports include their ability to provide 24-hour access to the port facility, as well as the identification of any tidal restrictions or seasonal limitations to access.

- **CTVs:** The majority of U.S. ports can serve as CTV ports with their existing specifications. CTVs typically depart and return to port on a daily basis and are generally within approximately 50 nautical miles of wind farms (New Jersey Economic Development Authority 2023).
- **SOVs:** Ports suitable for SOV use typically support larger vessels than CTV ports. SOVs generally make port calls on an infrequent basis and are designed for 2-week deployments (NREL 2024). Existing U.S. commercial port infrastructure is generally sufficient for maintaining the SOVs that will be used for the majority of routine and unscheduled maintenance of OSW turbines. Larger vessels needed for major repairs would need to be deployed out of a port designed to accommodate the required vessel and components, such as staging port.

3.6 Current Status of Ports and Planned and Implemented Port Expansions

As noted in BOEM 2016, much of the infrastructure critical to the success of OSW projects does exist in the United States; however, the majority of ports with sufficient infrastructure are currently serving other industries. Port modifications have already been implemented or are being planned on the Atlantic coast of the United States to accommodate OSW energy facility construction (e.g., New London, Connecticut;

New Bedford and Salem, Massachusetts). This section provides a brief summary of the current status of U.S. Atlantic coast ports as of the end 2024, and any publicly available information on planned and implemented port expansions to further support OSW.

3.6.1 Current Status of U.S. Ports

There are approximately 360 commercial ports in the United States today (U.S. Coast Guard 2018) handling various types of cargo. The most common types of cargo include petroleum products, chemicals, coal, farm products, timber products, iron, steel, soil, sand, gravel, and stone (American Association of Port Authorities 2013).

U.S. ports possess much of the required infrastructure for successful OSW project installation. Specifically, OSW staging ports require significant storage and laydown space, equipment to transport large cargo within the port, cranes to load and unload components from the vessels, sufficient quayside space to accommodate transportation and installation vessels, and sufficient overhead clearance to allow these vessels to reach the port and the project site. All of these capabilities are available today in many of the ports along U.S. coastlines. In the case of the cranes to load and unload components, this equipment typically is not provided by the port but is readily available for hire.

The exception is the capability of the typical U.S. cargo port to handle the weight of the heaviest OSW turbine components. Today's U.S. ports are configured for containers, dry bulk (e.g., grain, iron ore, or coal), liquid bulk (e.g., petroleum products, natural gas), break-bulk (e.g., lumber or steel products), and Ro/Ro cargo, whereas wind turbine components are considered to be break-bulk or heavy-lift cargo. Because the typical cargo that is managed at most ports is lighter than OSW turbine components, the typical port has a lower ground bearing capacity requirement at the quayside and in the storage area – typically in the range of 5 to 8 mt/m² (1,024 to 1,639 psf) (DNV GL 2014).

Improvements to quayside or storage ground bearing capacity can be accomplished by recompacting soils, adding surcharge piles, or various other ground improvement modifications (e.g., draining soils, confining soils, drilling of piles or columns). Quayside bearing capacity improvements will most likely require additional strengthening measures along the quayside bulkhead to maintain its structural integrity (e.g., driving or drilling of piles, construction of steel reinforced slabs). In addition, the deepening of berths will also require significant strengthening measures to be implemented at the quayside bulkhead.

As of July 2024 (Oceantic Network 2024), several existing U.S. ports on the Atlantic coast handle cargo for offshore or onshore wind projects, or both, including:

- New Bedford, Massachusetts (New Bedford Commerce Terminal and the Foss Marine Terminal)
- New London, Connecticut (New London State Pier)
- Quonset/Davisville, Rhode Island
- Portsmouth, Virginia (Portsmouth Marine Terminal)

These ports and port operators are therefore familiar with the size and weight of components, the fixturing and storage requirements, and the methods of transportation and loading/unloading from vessels of wind turbine components.

When assessing ports, it is possible that a port which does not meet a specific criterion identified in this study may still be able to accommodate a given project with alternative capabilities. As has been demonstrated in Europe, if reasonable alternatives are incorporated into the engineering design phase, a port with some capabilities below the minimum criteria can still be a feasible option for development. For example, a port may not have the on-site crane capabilities required for an OSW energy project, but with proper coordination may be able to bring in temporary mobile cranes capable of handling OSW

components for the duration of a project. Insufficient storage area bearing capacity may be overcome with proper planning and distribution of the components over a larger area or through planning and scheduling of storage management.

3.6.2 Existing U.S. Offshore Wind Energy Market

Since development of the 2016 Study, significant progress has been made in the installation of OSW projects. NREL issues an annual report that assesses the existing wind energy market and “pipeline” (i.e., projects that are in early-stage planning through decommissioning) (NREL 2024). As of May 31, 2024, the U.S. wind energy pipeline includes a total potential energy generation capacity of approximately 80,500 MW. The U.S. pipeline project status reported by NREL [2024] included the following:

- Three operating projects: Block Island Wind Farm (30 MW), Coastal Virginia Offshore Wind Pilot (12 MW), and South Fork Wind (132 MW)
- Three projects under construction: Vineyard Wind 1 (806 MW), Revolution Wind (704 MW), and Coastal Virginia Offshore Wind (2,587 MW)
- Four approved projects: Empire Wind 1 (810 MW), Sunrise Wind, New England Wind 1 and 2 (combined 1,664 MW)
- Eighteen projects that have submitted a Construction and Operations Plan to BOEM

NREL also reported that 20 projects in lease areas have secured rights to pursue development, and 16 proposed lease areas have projects in early stages of planning (NREL 2024). In addition, in 2024, the U.S. government announced approval of the SouthCoast Wind Project, located south of Martha’s Vineyard off the coast of Massachusetts, in January (U.S. Department of the Interior 2024); the Atlantic Shores Offshore Wind South Project, located off the coast of New Jersey, in September (BOEM 2024a); and the Maryland Offshore Wind Project, located offshore near the border between Maryland and Delaware, in December (BOEM 2024b).

3.6.3 Port Modifications for Wind Energy Development

There are a number of existing ports along the Atlantic coast that could provide some or all of the infrastructure elements needed to support the development of the OSW energy industry, with some level of modification. The willingness of port owners and operators and wind energy developers to undertake significant port modifications will vary from port to port and state to state, depending upon political and economic priorities, and is likely to be influenced by the numerous stakeholders affected and the various funding grants and mechanisms available. State government officials, port authorities, residents of surrounding communities, and existing port users (such as commercial fishers, cargo shippers, tug and tow vessel operators, and cruise line operators), as well as wind energy developers, construction trade unions, and manufacturers, will all have strong opinions and sometimes competing or conflicting priorities and expectations as to what modifications are warranted. These stakeholders should be engaged early and throughout the process where a port is under consideration for use to support an OSW energy project.

Where industrial activity is already in place at existing ports, modifications to accommodate the OSW industry would not be expected to result in significant change to many current environmental and socioeconomic impacts (e.g., noise, visual, land use); however, some impacts are still likely to occur. For example, construction requiring dredging or pile driving may result in impacts to biological resources from pile-driving noise and decreased water quality and impacts to cultural resources due to sediment disturbance; the increase in port use may result in impacts to socioeconomic resources due to changes in quantity or pattern of marine traffic and impacts to air quality due to construction and operational emissions. Where potential port sites are currently undeveloped, or would need to expand into undeveloped land, there are also potential impacts to aquatic and upland habitat and wildlife populations

due to habitat loss (e.g., the proposed Sears Island terminal at Searsport, Maine). If multiple ports plan to compete for or simultaneously serve the OSW industry, the cumulative effects of the environmental impacts from modifications at more than one port will need to be evaluated.

3.6.4 Port Networks

Small to medium-sized ports may not need to make physical modifications to their facilities to support the OSW energy industry. It may be possible for groups of regionally located ports to form alliances that allow them to service the OSW energy industry as a network of ports, with each port playing to its strengths and existing capabilities to benefit the network as a whole. Port collaborations in Europe demonstrate this concept. As U.S. developers assess existing ports and the costs associated with modifications, consideration should be given to similar collaborative efforts and the benefits they could provide.

3.7 Summary

Section 3.0 discusses OSW energy project components, types of ports needed for the OSW energy industry, the general infrastructure and capabilities required to support the OSW energy industry, and the current status of U.S. Atlantic coast ports relative to this industry. The key points from this section are:

- Ports are central to the manufacturing, construction, and O&M activities for OSW projects.
- Characteristics of ports (e.g., access channel and quayside dimensions; bearing capacities of quayside, haul roads, storage areas; Ro/Ro and crane capabilities) that represent the typical minimum requirements for handling cargo of the weight and dimensions involved in OSW projects are provided in Appendix A as a general guide.
- As noted previously, the minimum requirements are not absolute. Ports that do not meet minimum requirements may still be viable for some OSW construction activities at the expense of operational efficiency. Alternatively, a wind project can adjust the logistics and equipment to adapt to the port. For example, cranes can be rented for the duration of project construction, additional temporary load-spreading devices could be utilized, and the selection of vessels can be adjusted to meet the capacity and capabilities of the available berths and upland properties. An OSW project may select a port with greater or lesser capabilities depending on project needs, project timeline, and, notably, costs to provide any required supplements to port capabilities.
- The primary factors needed for a port to function as a staging and installation port for OSW energy projects are vessel access (berth capacity and depth, navigation channel depth and width, and vertical clearance between the port and the OSW project site); lifting capabilities; bearing capacity of the quayside and storage area; number of available berths; size of storage area; available transportation infrastructure; and the ability to accommodate specialized vessels like jack-up vessels.
- Many U.S. ports can serve as O&M ports with no modification to their current capabilities, provided large components for major maintenance (scheduled or unscheduled) can be staged from the original staging port or an equivalent.
- A potential path for improving port readiness is development of OSW component manufacturing facilities near a port. Such supply chain developments could produce the economic incentive for ports to improve their facilities to better serve OSW energy developers. It should be noted that the improvements required for ports supporting OSW component manufacturing will be specific to the type of component manufactured and the manufacturer's needs.
- The improvements made to ports to support OSW energy projects typically do not reduce the port's ability to continue to handle other types of cargo or serve other industries. Any impact to the port use fees and tariffs imposed on other industries based on the improvements must be considered by operators and developers before the upgrades are undertaken.

- There are a number of port capabilities required for OSW staging ports that are not commonly found in U.S. ports. Therefore, staging ports will typically require improvements before they are capable of supporting the construction phase for an OSW energy project. A number of ports on the U.S. Atlantic coast have or are undergoing such improvements, and these can serve as examples to other facilities. These improvements include:
 - Ground bearing capacity of at least 10 mt/m² (2,048 psf) at the quayside, along haul routes, and in storage areas
 - Seabed suitable (i.e., bearing capacity) for jack-up vessels at the quayside
 - Lifting capabilities in the port to be able to load, unload, and transport nacelles and foundations weighing in excess of 772 tons (700 mt)
 - Increasing access channel width and depth to support the required vessels and increased vessel traffic during construction
 - Available storage space on the quayside for staging and temporary storage of large and heavy components

Finally, proximity of the port to the OSW project site impacts the transit time for components and crew to and from the site, which impacts the overall project timeline and cost. Projects typically prefer to utilize a staging port as close to the project site as possible; however, the port's location is not likely to be the driving factor when selecting a staging port.

Given all the variables associated with the location and characteristics of existing ports, potential modifications, and workarounds, developers should conduct a cost-benefit assessment to identify the port that will be the most cost and schedule effective for a given project.

4 Port Identification

The port identification process was designed to identify 16 ports that could potentially support OSW energy development and were distributed across the following regions: Northern New England, Southern New England and the New York Bight (lease areas offshore of Rhode Island, Massachusetts, Connecticut, and New York), Mid-Atlantic (lease areas offshore of New Jersey, Delaware, and Maryland), and South Atlantic (lease areas offshore of Virginia, North Carolina, South Carolina, and Georgia).

Port identification was accomplished in three steps. First, a list of commercial ports on the Atlantic coast was assembled. Next, ports that already met, or could be modified to meet, minimum control and access criteria were identified as priority ports. Finally, the characteristics of each "priority port" were assembled and 16 geographically dispersed ports were selected based on criteria described below for development of a port profile. Hampton Roads in Virginia includes both the Ports of Norfolk and Portsmouth, which were combined into one port profile, resulting in the development of 15 port profiles. In addition, selection of the 16 ports for the full evaluation considered regionalization (i.e., a roughly equal distribution along the Atlantic coast), existing publicly available interest in development (e.g., ports where conceptual designs for modifications were made available for evaluation), and location relative to communities that would be impacted by port modifications.

The 16 ports for which profiles were developed include ports that were considered both suitable and likely to be used for OSW energy support; however, they do not necessarily represent ports recommended for use by BOEM and are not the only ports capable of supporting OSW. When OSW energy project developers identify and select ports for future potential OSW energy projects, other options may and should be considered.

4.1 Identifying Existing Atlantic Ports

A preliminary list of Atlantic coast ports was assembled from three published global port databases:

1. National Geospatial-Intelligence Agency (2019), *World Port Index - Pub. 150*, 27th Edition;
2. Searates (2023), United States Sea Ports; and
3. S&P Global (2024), *Ports and Terminals Guide 2023-2024*.

While each database purports to include all ports, the ports included in the databases reflect selection criteria established by the publishers. Therefore, the initial list of Atlantic coast ports was supplemented with information from publicly available sources (e.g., news articles or industry websites) that identified ports on the U.S. Atlantic coast currently supporting OSW energy development and ports that have previously been identified by developers for potential upgrading to support OSW energy projects.

After this initial compilation, recreational ports (i.e., marinas), which do not handle commercial cargo vessels or large passenger vessels and would be unlikely to be capable of supporting OSW projects, were excluded.

4.2 Initial Screening

The initial port screening considered current turbine capacities as well as those expected in the near-term future (12- to 15-MW turbines); ports that did not satisfy the minimum control and access criteria (access channel width of at least 360 feet and access channel depth of at least 40 feet) without “unreasonable” modifications were eliminated from further consideration (e.g., ports with existing navigational channels of 10 feet or less, or navigation channel widths less than half of the minimum required width for the proposed OSW port type). The result of this initial assessment and screening was a list of 67 “Prioritized Ports.”

4.3 Port Selection

Each of the 67 Prioritized Ports was characterized based on a) vessel access (berth capacity and depth; navigation channel depth, width, and vertical clearance restrictions) and ability to accommodate specialized vessels like jack-up vessels; b) lifting capabilities; c) bearing capacity of the quayside and storage area; d) number of berths; e) size of available storage areas; and f) access to terrestrial transportation infrastructure.

This characterization took the form of a worksheet similar to Table 4.3-1, the results of which are summarized in Appendix A. Some data were not available. For example, most ports either do not know or are unwilling to share the bearing capacity of their quaysides. Similarly, most ports do not know if their quayside seabed is suitable for jacking because their normal port operations do not require this capability. In these circumstances, the attribute is characterized as not available (“n/a”). However, the data might be available in the future with specific data requests from the U.S. government via BOEM, or through site-specific geotechnical studies.

Table 4.3-1. Port requirements by capability category worksheet

Capability Category	Requirement
Access	• Port access channel width • Port access water depths • Overhead draft • Number of berths
Quayside	• Quayside bearing capacity • Quayside length • Quayside water depths • Quayside seabed suitable for jacking
Upland Storage	• Haul route bearing capacity • Storage area bearing capacity • Size of storage area
Ro/Ro	• Ro/Ro capability • Width of Ro/Ro berth • Bearing capacity of Ro/Ro berth and ramps
Cranes	• On-site crane type and capabilities • Crane height restrictions
Transportation	• Transportation infrastructure

Seven attributes were considered when identifying the 16 ports for which profiles would be developed from among the 67 Prioritized Ports. Each attribute is described in the following bullets.

1. **Geography:** there was a general desire to evaluate ports in each of the four geographic regions identified in the introduction to Section 4.
2. **Access:** Access to the port was identified as 1 of 2 mission-critical attributes associated with OSW support readiness. If port accessibility is limited such that ships of the size required to deliver OSW project components to or from the port cannot physically access the port, then the port cannot be considered ready to support the OSW industry.
3. **Quayside:** Quayside capability was identified as the second mission-critical attribute associated with OSW support readiness. If the physical capabilities of the quayside facilities are not suitable to berth, load, and unload OSW components, the port cannot be considered ready for serving this industry.
4. **Storage:** Storage area and ground bearing capacity within a port is a very important attribute with respect to OSW support readiness. However, storage was not considered mission-critical because in many cases scheduling and delivery logistics options can overcome a port's storage limitations.
5. **Cranes:** The availability, type, and capacity of cranes in a port are very important in accommodating an OSW energy project, but not mission-critical. In the event that cranes of sufficient capacity are not available at a port, the appropriate cranes can typically be procured. In addition, many vessels have built-in cranes that load and unload components and some components may be loaded and unloaded using Ro/Ro methods.
6. **Transportation:** Access to onshore transportation infrastructure is considered to be moderately important to a port's readiness to accommodate an offshore energy project. Since most of the materials would be transported to and from the port by sea, only limited onshore transportation infrastructure in the vicinity of the port is considered necessary.
7. **Ro/Ro Capability:** Ro/Ro technology is a valuable capability for ports that are required to lift and move heavy or oversized components. Nonetheless, a port can use other means of loading, unloading, and moving wind farm components and still be effective.

While threshold values were associated with each requirement under three different scenarios (12–15 MW, 18 MW, and 21 MW) for port selection purposes, each port was characterized based on the 12- to 15-MW scenario as one of the following:

- Meets or exceeds most or all capability requirements;
- Meets or exceeds some capability requirements;
- Does not meet capability requirements, but information is available; or
- Information is not available.

Table 4.3-2 identifies 16 ports along the U.S. Atlantic coast that were selected for development of a port profile. These ports meet the minimum requirements to support OSW, have at least some existing key capabilities, and under practical scenarios could be modified to incorporate the infrastructure deemed necessary to fully support OSW.² Further, these ports are geographically dispersed, and they represent a cross section of the existing infrastructure and capabilities of U.S. Atlantic coast ports. Hampton Roads (Norfolk) and Hampton Roads (Portsmouth) were combined into one port profile, resulting in a total of 15 port profiles, located in Appendix B).

Port profiles were developed for 16 ports that were considered suitable and likely candidates for OSW energy support; however, those 16 ports do not necessarily represent the “best” ports for OSW energy support, ports recommended for use by BOEM, or the only ports capable of supporting OSW. When OSW energy project developers identify and select ports for future potential OSW projects, other options may and should be considered.

Table 4.3-2. Selected ports

Region	Port/Terminal	State
Northern New England	Searsport (Sears Island)	ME
	Portland	ME
	Salem	MA
Southern New England + New York Bight	Providence (East Quay)	RI
	Quonset Point/Davisville	RI
	New Haven	CT
	Bridgeport	CT
	Albany	NY
	Brooklyn (South Brooklyn Marine Terminal)	NY
	Arthur Kill	NY
Mid-Atlantic	New Jersey Wind Port (Lower Alloways Creek)	NJ
	Baltimore (Tradepoint Atlantic)	MD
	Hampton Roads (Portsmouth)*	VA
	Hampton Roads (Norfolk)*	VA
South Atlantic	Wilmington	NC
	Morehead City (Radio Island)	NC

* Portsmouth and Norfolk were evaluated jointly in a single port profile.

² The exception to this statement is the Searsport, Maine, location, which is associated with greenfield development on Sears Island. This site was selected because the state of Maine has identified the location as a site that could host OSW energy projects and may have attributes to support floating OSW.

5 Overview of Port Modifications, Impacts, and Expected Mitigation

The relationship between port modifications, impact-causing elements, and resource-specific impacts is established in this section.

The relationships are based largely on BOEM's 2016 Study updated to reflect the existing literature, discussions with selected experts (Section 2.0), and the authors' experience with environmental and socioeconomic reviews of construction projects and wind energy development under NEPA. We have also reviewed recent assessments prepared by the USACE related to port modifications in Corpus Christi, Texas, and Tampa Bay, Florida (USACE 2024a, 2024b).

5.1 Port Modifications

Ports are expected to host three categories of OSW activities: manufacturing and fabrication, staging and installation, and O&M.³ Associated with each activity type is a set of typical tasks, including loading and unloading components, transporting components, storing components, maintenance of components, fabrication of components, final assembly of components, and crew transfer. These activities, aside from some O&M functions, require specialized equipment or layout areas often not currently available at U.S. Atlantic ports.

For each of the 16 ports included in the study, existing capabilities were compared to applicable minimum requirements. If the port did not meet or exceed the minimum requirement for an activity, the adjustments necessary to do so were identified as port modifications. Where port information could not be obtained, it was assumed a port modification would be required to meet the applicable minimum standard. As shown in Table 5.1-1, construction activities often associated with port modifications include predictable activities such as sediment dredging, land clearing, compaction, and paving, among others.

Existing planning documents often specify construction activities related to specific port modifications. When provided, these construction activities were used as the basis of the port modification. If specific construction activities were not identified in planning documents or otherwise available, professional judgement was used to further characterize the port modification.

5.2 Impact-Causing Elements

The construction activities identified in Section 5.1 generate impact-causing elements (stressors) such as turbidity or noise that, in turn, can adversely affect air quality, cultural resources, ecological resources, and socioeconomic resources. Table 5.2-1 associates impact-causing elements with the construction activities common to port modifications.

³ Marine operations related to OSW can also extend to decommissioning, redeployment, and eventually, removal.

Table 5.1-1. Construction activities likely to be required for specific port modifications

Potential Modifications	Aggregate Dumping & Compaction	Fill Placement & Compaction	Blasting/Drilling	Pile Driving/Drilling	Concrete Deck Installation	Sediment Dredging	Concrete Block Installation	Land Clearing	Site Grading	Paving	Construction of Storage or Administrative Structure	Security Enhancements	Utility Line Moves or Extensions
Access													
Air Draft Improvement (Bridges, Utility Lines)			X	X		X							X
Channel Widening/ Deepening			X			X							
New Berth Construction	X	X		X	X	X	X						
Cranes													
Provide Fixed Crane	X	X		X	X			X	X	X			
Provide Mobile Crane	X	X		X	X			X	X	X			
Reduce Crane Height Restrictions			X					X	X				
Quayside													
Quayside Bearing Capacity Improvement	X	X		X	X			X	X	X			
Quayside Length Expansion	X	X	X	X	X	X	X	X	X	X			
Quayside Seabed Bearing Capacity Improvement	X			X		X							
Roll-On/Roll-Off													
Provide Ro/Ro Capability	X	X		X	X			X	X	X			
Ro/Ro Berth (Width/Air Draft)				X									X
Ro/Ro Berth Bearing Capacity Improvement	X	X		X	X			X	X	X			
Storage													
Haul Road Bearing Capacity Improvement	X	X						X	X	X			
Storage Area Bearing Capacity Improvement	X	X						X	X	X			
Storage Area Size Expansion (Open or Covered)	X	X						X	X	X	X	X	
Transportation Infrastructure													
Modify Rail Line	X	X	X					X	X			X	
Modify Road (widen, turning, bearing)	X	X	X					X	X	X		X	

Table 5.2-1. Impact-causing elements likely to result from construction activities

Construction Activities	Sediment Suspension & Deposition	Discharges - Dewatering	Discharges - Stormwater	Aquatic Habitat Alteration	Aquatic Noise	Vessel/Equipment Interaction	Soil Disturbance/ Erosion	Terrestrial Habitat Alteration	Lighting	Terrestrial Noise	Vessel Traffic	Vehicle Traffic	Air Emissions	Highly Visible Construction Infrastructure	Space Use Conflicts	Increased Demand for Local Labor and Services	In-migration of Project Workers	Increased income and Sales Tax Revenue
In-Water Activities																		
Aggregate Dumping	X			X					X	X	X		X			X	X	X
Aggregate Compaction	X								X	X	X		X			X	X	X
Fill Placement	X			X			X		X	X	X		X			X	X	X
Fill Compaction	X								X	X	X		X			X	X	X
Blasting	X			X	X	X			X	X	X		X		X	X	X	X
Blasting/Drilling	X			X	X	X			X	X	X		X			X	X	X
Drilling	X				X	X			X	X	X		X			X	X	X
Pile Driving/Drilling	X			X	X	X			X	X	X		X			X	X	X
Dredging	X	X		X		X			X		X		X		X	X	X	X
Sediment Dredging		X		X		X			X		X		X		X	X	X	X
Rock Dredging				X		X			X		X		X		X	X	X	X
Concrete Block Installation	X			X		X			X		X		X			X	X	X
Utility Line Moves	X									X		X	X	X		X	X	X
Utility Tower Extensions	X									X		X	X	X		X	X	X
Terrestrial Activities																		
Aggregate Dumping							X	X	X	X		X	X			X	X	X
Aggregate Compaction									X	X		X	X			X	X	X
Fill Placement							X	X	X	X		X	X			X	X	X
Fill Compaction									X	X		X	X			X	X	X
Land Clearing			X				X	X	X	X		X	X		X	X	X	X

Construction Activities	Sediment Suspension & Deposition	Discharges - Dewatering	Discharges - Stormwater	Aquatic Habitat Alteration	Aquatic Noise	Vessel/Equipment Interaction	Soil Disturbance/ Erosion	Terrestrial Habitat Alteration	Lighting	Terrestrial Noise	Vessel Traffic	Vehicle Traffic	Air Emissions	Highly Visible Construction Infrastructure	Space Use Conflicts	Increased Demand for Local Labor and Services	In-migration of Project Workers	Increased income and Sales Tax Revenue
Paving			X					X	X	X		X	X		X	X	X	X
Construction of Storage Structure(s)			X						X	X		X	X		X	X	X	X
Blasting										X			X		X	X	X	X
Blasting/Drilling										X			X		X	X	X	X
Drilling										X			X			X	X	X
Pile Driving/Drilling										X			X			X	X	X
Utility Line Moves									X	X	X	X	X	X		X	X	X
Utility Tower Extensions									X	X	X	X	X	X		X	X	X

Operational activities are also associated with impact-causing elements. The primary impact-causing elements of concern related to operations are increased air, noise, and light emissions associated with a general increase in port-related activity that would be brought about if an OSW project chose to utilize a specific port because it had been modified to accommodate OSW energy development.

While the effects of impact-causing elements are specific to each location, Table 5.2-2 identifies the general relationship between a) impact-causing elements, b) resource categories evaluated, and c) port modification phase (i.e., construction or operation) in which impacts are likely to occur.

Table 5.2-2. Scope of impact-causing element by resource category

Impact-Causing Element	Ecological	Air Quality	Cultural	Socioeconomic
Sediment suspension and deposition	C	–	C	C
Discharges – dewatering	C	–	–	C
Discharges – stormwater	C, O	–	–	C, O
Aquatic habitat alteration	C, O	–	C	C, O
Aquatic noise	C, O	–	–	C, O
Vessel/equipment interaction	C, O	–	C, O	C, O
Soil disturbance/ erosion	C	–	C	C
Terrestrial habitat alteration	C, O	–	C	C
Lighting	C, O	–	C, O	C, O
Terrestrial noise	C	–	C, O	C, O
Air emissions	–	C, O	C, O	C, O
Vessel traffic	C, O	–	C, O	C, O
Vehicular traffic	–	–	C, O	C, O
Highly visible infrastructure	–	–	C, O	C, O
Offshore/onshore space use conflicts	–	–	–	C, O
Increased demand for local labor and services	–	–	–	C, O
In-migration of project workers	–	–	–	C
Increased income and sales tax revenue	–	–	–	C, O

Note: C = impact occurs during construction phase; O = impact occurs during operations phase; – = no impact.

5.3 Overview of Impacts Anticipated from a Typical Port Modification

While the port modifications required to support OSW energy development in the Atlantic OCS will vary depending upon the existing infrastructure on-site (e.g., number and status of wharves, storage area available) and off-site (e.g., location of federal navigation shipping channels) the port modifications identified herein revolve around expanding and improving the general categories of access, berthing, quayside capabilities, and storage.

As shown in Tables 5.1-1, 5.2-1, and 5.2-2, the typical port modifications required result in a predictable set of construction activities and associated impact-causing elements. The magnitude and duration of actual impacts will vary depending on numerous factors, including existing conditions and mitigation measures employed at any particular site.

The remainder of Section 5.3 outlines the general relationships between a) impact-causing elements and b) impacts associated with broad resource categories.

5.3.1 Air Quality

The identified port modifications would require the use of tools, vehicles, and vessels during construction; these activities produce air emissions including internal combustion engine emissions (e.g., carbon dioxide and carbon monoxide), dust, and other airborne particulates generated by land disturbance that may impact local air quality. These temporary increases in emissions will persist throughout construction activities and could fluctuate based on daily operational intensity. Once construction of the port modification is complete, the net change in air emissions in the immediate vicinity of the port is unclear. If general activity at the port remains elevated above baseline because OSW projects have opted to use the port, localized emissions may remain elevated. Typically, OSW construction activities have a 1-to-3-year duration, following which general activities would return to near baseline conditions; however, multiple projects may be constructed from a port over time. This increase would, perhaps, be partially offset if OSW energy displaces electricity that would otherwise be generated using fossil fuel at local generating facilities.

5.3.2 Cultural Resources

The cultural resources at issue are primarily historic and archaeological resources that would be subject to physical and non-physical impacts. In general, three cultural resource environments could be impacted: 1) aboveground historic areas, buildings, structures, or objects, typically 50 years of age or older, 2) ground surface or buried terrestrial archaeological sites, and 3) seafloor or riverbed archaeological sites, including shipwrecks. These can include historic properties of traditional religious and cultural significance to federally recognized Tribal governments, which significance relies on Tribal consultation to identify. Submerged paleolandforms are reviewed and characterized where identified but are not a focus of the cultural resources study, as state-level historic property documentation does not consistently record these geological features unless associated with an inventoried historic property.

Terrestrial and marine archaeological sites, where present, would be subject to adverse physical effects from ground-disturbing or shoreline-disturbing activities (e.g., earthmoving, vegetation clearing, excavation, dredging, fill, setting foundations, anchoring, soil or sediment saturating spills). Aboveground historic buildings and structures would be physically impacted where changes are made during construction or operations to the building, structure, or associated site features (e.g., on-site facilities or landscaping) that affect its integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance (as through demolition of a building or structure, additions, or changes in use or materials of the building, structure, or site features). Archaeological sites and aboveground historic buildings and structures could also be adversely affected when non-physical (visual, auditory, or atmospheric) impacts result from construction or operations that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered views, removal of historic features in the viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased or changed nighttime lighting).

5.3.3 Ecological Resources

Impact-causing elements associated with construction and operational activities could impact a variety of ecological resources both directly and indirectly. The general conceptual approach to several broad ecological resource categories is described below.

Water Quality: Dredging and similar seafloor-disturbing activities may result in increased turbidity and potential release of contaminants into the water column from contaminated sediments. Sediment testing and turbidity monitoring are often employed to minimize impacts to water quality. Impacts associated with increases in turbidity are temporary (expected to last throughout construction activities) with

conditions returning to preconstruction conditions shortly after construction is completed. Impacts to water quality may also result from stormwater runoff, dewatering (removal of water from a site for construction activities to take place below surface water and groundwater), accidental spills, and the unintentional release of trash and debris. These potential impacts would be controlled by the employment of standard site management practices.

Sediment Quality: Onshore and benthic sediment quality is not anticipated to be impacted due to routine construction and operation activities; however, accidental releases of oil and gas products used for construction equipment, routine operations vehicles, and vessels making port calls may occur. These potential impacts would be controlled by the employment of standard site management practices, and vessel spill contingency plans.

Terrestrial Habitats: Terrestrial habitats have the potential to be impacted by land-side construction activities including land clearing, drilling, fill placement and compaction, and paving. Potential impacts include loss of habitat and disturbance due to noise and land clearing. Impacts are expected when expanding into area of previously undeveloped coastal habitat. Impacts to terrestrial habitats are expected to a lesser degree when expanding within the footprint of an existing port facility. Activities that result in land clearing and land use change from habitat to port activity are permanent activities, which would likely result in some form of mitigation.

Onshore Aquatic Habitats: Onshore aquatic habitats have the potential to be impacted by land-side construction activities including land clearing, drilling, fill placement and compaction, and paving. Impacts to coastal habitat could include the reduction or loss of habitat for aquatic and terrestrial biota, particularly nesting, roosting, and foraging habitat for birds and bats, and nursery grounds for commercially and ecologically valuable fish species. Onshore aquatic habitats likely to be affected by port modifications include herbaceous and forested freshwater wetlands, salt marshes, and streams. Activities that result in large areas of wetland fill and land use change from habitat to port activity are permanent activities, which would likely result in some form of mitigation.

Shorelines: Currents and water movement may be impacted by the construction of a new berth or significant alteration of the seafloor/shoreline at an existing port. Shoreline and adjacent seafloor alteration could result in shoreline erosion in surrounding areas due to changes in currents and water movement. Studies should be completed prior to construction to determine the likelihood and extent of impact. In some cases, ocean currents and movements in an area could improve as a result of dredging.

Submerged Marine Habitats/Benthic Resources: Impact to the benthic habitat and benthic community is one of the primary impacts identified during port modification activities, namely from the dredging of the seafloor along the port berth and quayside, as well as within the harbors and channels. Potential impacts include loss of aquatic habitat (e.g., seagrass, eelgrass, and shellfish communities), smothering and crushing of benthic organisms, increased turbidity and reduced water clarity, and release of contaminants from contaminated sediments. Impacts to the benthic community are temporary, lasting throughout construction.

Fish and Invertebrates: Fish and essential fish habitat (EFH), including habitat for Endangered Species Act (ESA) species and critical habitat, may be impacted by dredging of the seafloor associated with port modifications, as well as by the noise associated with increased activity at the port. Dredging and similar seafloor-disturbing activities may result in loss of habitat and increased turbidity and sedimentation. Increased turbidity could result in gill clogging in adult fish and smothering and crushing of eggs/larvae. Noise associated with vessel traffic, dredging, blasting, and pile driving may cause fish to leave the area but is unlikely to cause injury. Impacts and injury to fish with air bladders could occur as a result of blasting and drilling. In most cases, the impact will be temporary (expected to last throughout construction activities) with conditions returning to preconstruction conditions and individuals returning

to the area shortly after completion of construction. Under the ESA, incidental take authorizations are required for activities that produce underwater sound, including pile driving associated with construction projects that have the potential to impact ESA species. Depending on the location and species present, time-of-year restrictions may be employed to avoid or minimize disturbance. Noise abatement or deterrent techniques may also be employed, as well as turbidity monitoring during dredging activities.

Marine Mammals and Sea Turtles: Marine mammals and sea turtles are most likely to be impacted by the noise associated with increased activity at the port. Noise associated with vessel traffic, dredging, blasting, and pile driving may cause any marine mammals or sea turtles to temporarily leave the area, resulting in an incidental take, but is unlikely to cause injury. Under the ESA and Marine Mammal Protection Act, incidental take authorizations or incidental harassment authorizations are required for activities that produce underwater sound, including pile driving associated with construction projects. In most cases, the impact will be temporary (expected to last throughout construction activities) with conditions returning to preconstruction conditions and individuals returning to the area shortly after completion of construction. Depending on the location and species present, time-of-year restrictions may be employed to avoid or minimize disturbance. Noise abatement or deterrent techniques may also be employed. An incidental take authorization often includes additional monitoring of the area for the presence of indicated species to avoid or minimize injury or death.

Birds and Bats: Birds and bats are most likely to be impacted from noise associated with construction activities, and an increase in ambient lighting during construction and operation. Noise associated with vehicle/vessel traffic and drilling may cause birds to leave or avoid the area but is unlikely to cause injury; likewise, any construction activities occurring at night may impact foraging bats. In most cases, the impact will be temporary (expected to last throughout construction activities) with individuals returning to the area shortly after completion of construction. The modification of existing bridges and towers also has the potential to temporarily alter the migration patterns of birds and roosting locations for bats. Depending on the location and species present, there may be restrictions placed on the hours of construction and lighting requirements. Noise abatement or deterrent techniques may also be employed. Additional impacts related to birds may include the ingestion of contaminants and collision risks. During dredging operations contaminants may be suspended into the water column and ingested/filtered by animals preyed on by birds. Silt curtains and temporary cofferdams in conjunction with water quality monitoring will mitigate the potential impacts. The added risk of collision may occur due to the raising of utility lines and towers. Anti-perching and utility line marking measures may be utilized to minimize these avian interactions.

Other Terrestrial Biota: Terrestrial habitat and biota have the potential to be impacted by land-side construction activities including land clearing, drilling, fill placement and compaction, and paving. Potential impacts include loss of habitat and disturbance due to noise and land clearing. Noise associated with vessel traffic and drilling may cause biota to leave or avoid the area but is unlikely to cause injury. Increased noise because of construction will be temporary with conditions returning to preconstruction conditions and individuals returning to the area shortly after completion of construction. Activities that result in land clearing and land use change from habitat to port activity are permanent activities, which would likely result in some form of mitigation. Depending on the location and species present, there may be restrictions placed on the construction in the form of time-of-year restrictions or work-hour restrictions. Noise abatement or deterrent techniques may also be employed.

5.3.4 Socioeconomic Considerations

Impact-causing elements associated with construction and operational activities could impact a variety of socioeconomic resources both directly and indirectly. The general conceptual approach to evaluating potential impact to several broad socioeconomic resource categories is described below.

Land Use: Expansion of port boundaries or facilities could generate space use conflicts with current or planned uses. Space use conflicts are more likely in ports requiring construction modifications beyond their current property. Activities that require dredging, pile driving, or fill placement may generate space use conflicts because dredging may occur over a larger area.

Infrastructure: Expansion of port boundaries or facilities could generate space use conflicts with existing infrastructure such as airports or major roadways. Space use conflicts are more likely in ports requiring construction modifications beyond their current property.

Special Use Areas: Special use areas may include military areas, airspace for military operations or other civilian airport operations. Impacts to military use areas from modifications to ports depend on the existence of space use conflicts between port modifications and military activities such as vessel training exercises and aviation exercises. Because military vessel operations that are not compatible with commercial or recreational activities are typically confined to Military Operating Areas away from commercially used waterways, conflicts are generally not anticipated.

Visual Resources: Impacts to visual resources depend on a) the existing visual setting and b) the contrast between that setting and the proposed change. Adverse impacts are exacerbated when existing viewsheds are pristine or highly valued, contrast is high, or the number of viewers is high. Effects during construction may include the presence of large equipment and bright lighting; the installation of tall cranes; and modification to bridges and powerlines. Operations at floating OSW ports may include assembly and storage of floating wind towers in and around the port, which may be considered a long-term adverse impact. Viewshed alterations associated with port modifications are generally limited because the ports already represent an industrialized viewshed (Environmental Protection Agency [EPA] 2012; Royal Haskoning 2003; USACE 2024b); however, if the modification increases the number or size of ships calling on the port, the size of equipment operating at the port, or the size of materials being staged or stored at the port, some may characterize this as a long-term adverse impact (USACE 2024b).

Noise: Increases in noise emissions may occur in locations adjacent to construction and may also be associated with an increased operational tempo. Port modifications requiring pile-driving would have high potential to create direct socioeconomic impacts (i.e., noise perceived by humans) and indirect socioeconomic impacts (i.e., noise that adversely affects ecological receptors that provide services to humans). While these noise emissions can adversely affect human health and lower surrounding property values, USACE (2024a and 2024b) found the direct impact of noise to be short term.

Air Quality: Emissions from vehicles, vessels, and equipment may degrade local air quality during construction and operations. These degradations can adversely affect human health and lower surrounding property values.

Terrestrial Traffic: Vehicle traffic may be impacted by the transportation of construction materials and workers during port modification, whether directly, if construction materials are transported by truck, or indirectly, through traffic delays at crossings with rail lines, if materials are transported by rail. Transportation on land may also be affected if port expansions occupy areas currently in use by vehicle or rail traffic or if port modifications include road improvements.

Maritime Navigation: Vessel traffic in the proximity of the port may be temporarily and adversely impacted by some activities such as dredging (e.g., vessel transit delays of hours or days to accommodate dredging operations). Once modifications are complete, port traffic may remain elevated if the port is selected to support OSW energy development. While increased traffic can increase navigational risk and may displace traditional port users, improved access tends to improve navigational safety overall (EPA 2012; Royal Haskoning 2003; USACE 2024a, 2024b).

Commercial Shipping: Increased port activity has the potential to create port congestion which could create delays in docking, loading, and unloading activities. Repurposing port infrastructure from commercial shipping activities to supporting OSW activities may also reduce shipping capacity and efficiencies.

Commercial and Recreational Fishing: Because offshore activities for port modifications would be limited to the immediate vicinity of the port, and potentially the port channel (if widening or deepening is necessary), impacts on fisheries are expected to be mostly limited to space use conflicts in the use of port facilities and access channel.

- BOEM (2016) reports that material conflicts had not occurred and were not expected. At Rotterdam and Harwich, fisheries faced some restrictions at the location of the sand extraction pits or during dredging (Royal Haskoning 2003, 2007). At Tampa Harbor, the USACE (2024b) found construction would likely cause a temporary reduction in the availability of boating, fishing, and diving, but the beneficial dredge disposal would increase such opportunities in the long run.

Recreation and Tourism: Temporary effects could occur through construction-related noise, congestion, or air emissions. Permanent effects could occur through visual effects if taller cranes are installed at ports or if bridges or utility towers are modified to improve air draft. Positive impacts in the form of increased accessibility and port calls by cruise ships could result from channel deepening, air draft improvements, and creation of additional berthing space.

- Previous studies have often found the impact of port modifications on recreation and tourism to be temporary (EPA 2012; Royal Haskoning 2007; USACE 2015, 2024b).

Population Levels, Demand for Public Services, and Demand for Housing: If material numbers of construction workers relocate to communities near the port, population levels, demand for public services, and demand for housing may temporarily increase. These impacts may be mitigated if some workers are housed on dredging vessels (USACE 2024b). Given the smaller workforces associated with the postconstruction timeframe, material impacts to population levels, public service demand, and demand for housing are not anticipated once construction of any modifications is complete.

Demand for Local Labor and Income Levels: Port modifications would be expected to bring a temporary direct increase in demand for local labor and income levels. This may be followed by a second increase if modifications are followed by the staging of OSW projects, and potentially a third increase if the port is selected to support O&M.

- Navigant Consulting, Inc. (2013), reported that a \$50 million investment in a U.S. North Atlantic port would be associated with 300 annual statewide jobs over a 2-year construction period. During the New Bedford port modifications, local jobs were estimated at 150 short-term construction jobs, with larger numbers during staging and operations (South Coast Today 2013). Brancaccio et al. (2024) report the rate of return on port investments can be as high as 298%.

Community Cohesion: Community cohesion refers to the degree to which members of a community are interconnected with one another and encompasses the strength of positive relationships within a community. An influx of people into a community or the introduction of a divisive issue that pits community members in opposition to each other may alter the degree of connectedness. Port modifications are not likely to directly affect community cohesion. If modifications result in traditional port users being excluded due to space use conflicts brought about by port modification, community cohesion could be indirectly affected.

Government Revenues: The direct, indirect, and induced economic activity associated with construction of port modifications would increase government revenue via increased property taxes, increased sales taxes, and potential ad valorem taxes. If modifications attract OSW projects, the increase in government revenue would be followed by a second increase associated with OSW construction and potentially a third increase associated with OSW O&M.

5.4 Mitigation Measures

5.4.1 Overview of Mitigation Types

Mitigation in the NEPA regulations is broadly defined as measures that avoid, minimize, or compensate for adverse effects caused by a proposed action or alternative to that action.⁴ Measures that avoid or minimize adverse effects can require changes to the project design or implementation, and can be applicable to the construction, operational, or decommissioning phases of the project.

5.4.1.1 Avoidance and Minimization Measures

Avoidance and minimization measures vary widely, differing for environmental, socioeconomic, and cultural impacts. Many are standard measures that are used across multiple agencies and regulatory contexts and are termed best management practices for specific types of impacts (e.g., sediment and erosion control measures, noise abatement and soft-start/ramp up for pile driving, traffic and vessel speed restrictions, or standard practices to avoid disturbance of cultural artifacts). The measures can include changes or restrictions in project design (e.g., use of alternate technology or alternate locations), restrictions on timing of construction or operational activities, administrative protocols (e.g. enhanced communications), or development of planning documents (e.g., oil spill response plans).

These minimization and avoidance activities can be effective forms of mitigation that reduce the impacts to ecological resources and people and prevent further or more significant impacts from occurring. For example, a successful and widely used environmental minimization measure to mitigate impacts to aquatic protected species are the time-of-year restrictions that state and federal agencies place on marine construction activities to prevent these activities from taking place during sensitive spawning periods or life stages for aquatic species. For impacts to socioeconomic resources that cannot be avoided, minimization and mitigation measures are generally impact-specific; for instance, where project activities may cause increased traffic congestion, road widening, addition of traffic lights, and the development of a traffic management plan can be effective measures to minimize or mitigate impacts. For cultural resources, monitoring and discovery planning and procedures help avoid and minimize impacts to archaeological sites and historic properties.

⁴ 40 CFR 1508.1: *Mitigation* means measures that avoid, minimize, or compensate for effects caused by a proposed action or alternatives as described in an environmental document or record of decision and that have a connection to those adverse effects. Mitigation includes, in general order of priority:

- (1) Avoiding the adverse effect altogether by not taking a certain action or parts of an action.
- (2) Minimizing the adverse effect by limiting the degree or magnitude of the action and its implementation.
- (3) Rectifying the adverse effect by repairing, rehabilitating, or restoring the affected environment.
- (4) Reducing or eliminating the adverse effect over time by preservation and maintenance operations during the life of the action.
- (5) Compensating for the adverse effect by replacing or providing substitute resources or environments.

Avoidance and minimization measures are generally identified and evaluated during the regulatory project review process. Required measures are imposed through permits and authorizations by regulatory bodies on a specific area (port authorities, municipalities, states, etc.) or resource (EPA, NOAA Fisheries, U.S. Fish and Wildlife Service [USFWS], State Historic Preservation Officer [SHPO], etc.). These permits and authorizations often also include monitoring and reporting requirements to ensure the measures are implemented and to evaluate their effectiveness.

Avoidance and minimization actions that are commonly used for port development projects or projects with similar construction activities (e.g., land clearing, paving, dredging) and impact-causing elements (e.g., noise, air emissions, soil disturbance) are identified in Section 5.5.3 below. The estimates of impacts described in the port profiles assume that these commonly used measures will be implemented during port construction and operations.

5.4.1.2 Compensatory Mitigation

Compensatory mitigation may be required in the form of on- or off-site enhancement, restoration, and preservation or mitigation credits to address unavoidable impacts or impacts that will remain, even after project completion.

As compensatory mitigation relates to ecological impacts, the most commonly encountered example relates to compensation for unavoidable impacts to wetlands. Specifically, under Section 404 of the Clean Water Act (CWA) of 1972, as amended, persons responsible for unavoidable impacts to wetlands must compensate the public for those impacts by creating wetland acreage that otherwise would not exist.

Similarly, compensatory mitigation for socioeconomic impacts may take the form of a contingency fund that is set up to compensate for losses. For example, contingency funds could be established to provide compensation to fishers where port expansions prevent access to fishing grounds. Other forms of socioeconomic compensatory mitigation may include the improvement of infrastructure for specific industries. For example, to compensate for adverse effects of congestion during construction, a port may improve docks, offloading ramps, or fueling stations used by existing clients. For ports with tourism and recreational activities, mitigation may include improved or new tourist facilities or transportation between the port and tourist attractions. Similarly, dredging, channel widening, air draft improvements, and improved bearing capacity of quayside may impart benefits on existing port users.

Mitigation of adverse effects to significant archaeological sites or historic properties (i.e., those eligible for listing on the National Register of Historic Places [NRHP]) tends to focus on providing public value. This frequently involves data recovery excavations at archaeological sites to provide information on the history that is being lost or diminished due to physical impacts at the site (e.g., due to earth or seafloor or riverbed disturbance). For aboveground historic properties, such as historic buildings, this often includes the development of interpretive materials regarding property or area history to further understanding of national, state, or local heritage in compensation for impacts to the property or its setting (e.g., due to removal or change of the building or due to visible, audible, or atmospheric changes to its historic setting). Other innovative mitigation measures may also be developed, and this is typically done with public, stakeholder, and SHPO input.

5.4.2 Mitigation by Impact Categories

5.4.2.1 Air Quality

The primary form of mitigation related to air emissions includes compliance with existing laws and regulations along with adoption of best management practices related to idling and the maintenance of equipment. In some circumstances, seasonal restriction and or restrictions related to the use of fossil fuel–

based equipment may be effective. In addition, emissions cap-and-trade programs, which are essentially market-based mitigation programs, exist.

5.4.2.2 Cultural Resources

Best practices for mitigation of impacts to cultural resources follow the procedures outlined in the regulations for the National Historic Preservation Act Section 106 compliance (36 Code of Federal Regulations [CFR] 800), which first seeks to avoid then minimize and mitigate adverse effects to cultural resources listed on or eligible for the NRHP. Cultural resources that are listed or eligible for listing on the NRHP are referred to as historic properties. An adverse effect, under Section 106, is one that may alter, directly or indirectly, any characteristics qualifying a property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Cultural resources best practices first seek to avoid impacts to historic properties by preserving them in place. This can be accomplished by excluding them from earth, seafloor, or riverbed disturbing project activities, modification, or demolition to avoid physical impacts and by maintaining or increasing distance and appropriate screening of project facilities, construction activities, land and sea traffic, facility, vehicle, and vessel lighting, etc., from historic properties to avoid or minimize non-physical (visual, audible, atmospheric) impacts on historic properties. For unavoidable adverse effects on cultural resources and historic properties listed or eligible for listing on the NRHP after any minimization options have been applied, common mitigation of adverse effects may then include data recovery work at archaeological sites (terrestrial and marine), development of interpretive historical materials for aboveground historic properties, or other innovative measures developed in coordination with SHPOs, Tribal Nations, other consulting parties and stakeholders, and with the opportunity for public input.

Appropriate methodologies for the treatment of cultural resources do not simply rely on known or previously documented cultural resource locations. The steps of the Section 106 process indicate efforts should be made to identify cultural resources in the area of potential effects (physical and non-physical) for a project, assess the potential for effects on those resources, and avoid, minimize, and mitigate any adverse effects in consultation with SHPOs, Tribal Nations, other consulting parties, and with public input. Best practices recommend monitoring, discovery, and preservation approaches to maintain and monitor avoidance, minimization, and mitigation efforts during project construction and operations. These practices also address any unanticipated discovery of previously unidentified archaeological or historic sites or unintended impacts that might arise during construction or operations.

5.4.2.3 Ecological Resources

Wetlands, streams and other aquatic resources: The CWA is the primary Federal statute regulating the protection of the nation's water, with the objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Toward achievement of this goal, the CWA prohibits the discharge of dredged or fill material into wetlands, streams, and other waters of the United States unless a permit issued by the USACE or approved State under CWA Section 404 authorizes such a discharge. When there is a proposed discharge, all appropriate and practicable steps must first be taken to avoid and minimize impacts to aquatic resources. For unavoidable impacts, compensatory mitigation is required to replace the loss of wetland, stream, or other aquatic resource functions and area. Under the Compensatory Mitigation for Losses of Aquatic Resources (33 CFR Parts 325 and 332; 40 CFR Part 230) (73 *Federal Register* 19594, April 10, 2008), the USACE (or approved state authority) is responsible for determining the appropriate form and amount of compensatory mitigation required. Methods of providing compensatory mitigation include aquatic resource restoration, establishment (creation), enhancement, and, in certain circumstances, preservation.

ESA-Listed Species and Critical Habitat: Mitigation banks and in-lieu fee programs are important tools to help meet conservation objectives. They also help streamline ESA consultations through the USFWS and NOAA Fisheries and add predictability to the regulatory permitting processes. Mitigation can help achieve conservation objectives like the increase in critical functioning habitat for protected species while allowing for development. When mitigation is provided in the form of a bank or in-lieu fee programs, benefits include economy of scale and certainty of success. Each agency has issued updated guidance on their review and requirements for mitigation; however, neither of these orders supersede, alter, or substitute for the authorities, standards, and procedures provided by the applicable statutes or the regulations implementing those statutes.

- On May 15, 2023, the USFWS revised its Mitigation Policy and ESA Compensatory Mitigation Policy (88 CFR 7644–7663; 81 CFR 95316). These two policies influence how the USFWS will consider and address mitigation goals and standards. The USFWS will apply these revised policies to determine what types of actions qualify as mitigation. In practice, the new policies will make the species mitigation process similar to the Compensatory Mitigation for Losses of Aquatic Resources, as described above.
- On July 22, 2022, the NOAA Administrative Order 216-123: NOAA Mitigation Policy for Trust Resources was issued describing the NOAA Fisheries comprehensive national policy on mitigation. Implementation of this policy will allow action agencies and project proponents to anticipate NOAA Fisheries recommendations or requirements and develop appropriate mitigation measures early in the planning process, thus improving the efficiency and timeliness of the project evaluation and approval process.

EFH Conservation Recommendations: Under the Magnuson-Stevens Fishery Conservation and Management Act (16 United States Code 1855(b)) (Magnuson-Stevens Act), federal action agencies consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH, under 305(b)(2) and 305(b)(4)(B) of the Magnuson-Stevens Act, and the EFH Conservation Recommendation requirement of section 305(b)(4)(A) of that Act. When completed, an EFH consultation generally consists of 1) notification to NOAA Fisheries of a federal action that may adversely affect EFH; 2) an EFH assessment provided to NOAA Fisheries; 3) EFH Conservation Recommendations provided by NOAA Fisheries to the Federal action agency; and 4) the federal agency's response to NOAA Fisheries' EFH Conservation Recommendation(s). Similar to compensatory mitigation for ESA-listed species and their critical habitat, adverse impacts to EFH for managed species are recommended to be offset by mitigation in the form of banks or in-lieu fee programs.

5.4.2.4 Socioeconomics

Mitigation for Socioeconomic impacts may take many forms depending on the specifics of the project and location. In situations where an influx of workers may place a strain on a community or infrastructure, developers are often required to produce a traffic management plan or worker housing plan designed to address location specific issues. Mitigation may take the form of coordinating construction shift-changes to avoid existing peak traffic times or shuttling workers from more remote areas to avoid congestion areas near the project site. To avoid potential impacts in surrounding communities, developers may propose to limit activities to typical working or daylight hours. Developers may agree to compensate local governments for damage or excessive wear on public roadways or infrastructure.

6 Environmental and Socioeconomic Port Profiles

6.1 Introduction to Port Profiles

Sixteen ports were selected for development of port profiles. Each profile provides a general overview of the port and a classification of its existing capabilities, then describes the nature of the site-specific modifications that would be required for the port to support OSW energy projects. This is followed by a summary of the existing conditions and anticipated impacts of these potential modifications as they relate to air quality and cultural, ecological, and socioeconomic resources. Should port modifications at a specific port included in this study be considered for actual development, a more thorough and detailed environmental assessment would need to be conducted. Two ports in very close proximity to one another at Hampton Roads, Virginia, were evaluated jointly, resulting in 15 port profiles.

The information gathered for each of the port profiles was drawn from publicly available sources. In some cases, information was not available or was inconsistent across data sources. If this could not be resolved, information is identified as not available in the port profile. This information may be acquired in the future with specific data requests or geotechnical studies at a port.

- Information contained in each profile was obtained in 2024 and may change with the passage of time. Each port profile includes a date to provide future readers with the context of when the profile was prepared.

The profiles were developed using a standardized template containing the following sections: Port Overview (which characterizes existing capabilities and describes potential port modifications); Air Quality; Cultural Resources; Ecological Resources; and Socioeconomics. In general, each section includes information on existing conditions, impact-causing elements, impacts, and potential mitigation measures.

The information reflects data availability at the time of writing along with general impacts that have been associated with similar construction activities at ports across the United States and in Europe. However, OSW energy development is constantly evolving. Therefore, future port modifications may impart impacts not contemplated in these profiles.

6.2 Port Overview

The port overview provides a general description of the port, including the geographic location, identification of available terminals, port governance, primary uses, land area, port employment (where available), and distance to closest wind energy area. In instances where there are multiple terminals identified within a port, the terminal with the greatest potential to support OSW energy development is identified and described.

6.2.1 Existing Capabilities

In this section, ports are classified as potential manufacturing and fabrication ports, staging and installation ports, or O&M ports, or a combination (e.g., a port could support both staging and installation and O&M). For the port profiles, the focus was primarily on identifying ports that were suitable for staging and construction activities as ports used for O&M activities have greatly reduced requirements. Routine O&M activities may be supported by a broader range of smaller, less well-equipped ports and would likely require fewer potential port modifications. Some ports that are advantageously located but primarily suitable for O&M are also included in the port profiles (e.g., Portland, Maine).

Location relative to the nearest wind energy area will likely be the key factor in the ability of smaller ports to support O&M activities, as extended distance and transit time would preclude ports from efficiently supporting routine O&M activities. Therefore, the location of the port is illustrated.

Each port's existing capabilities are characterized as they relate to the attributes in Table 6.2-1 and then compared to a set of screening criteria in order to determine the port's readiness to support OSW energy projects. The 15-MW wind turbine scenario was chosen for this screening because it is the current standard (see Appendix A for details).

Table 6.2-1. Port capability criteria

Capability Area	Criteria	Unit	15-MW Scenario Threshold Value
Access	Channel width	Feet	360
	Channel controlling depth	Feet	40
	Air draft	Feet	410
	Number of berths	Count	2
Quayside	Quayside bearing capacity	Metric tons per square meter	15–30
	Quayside length	Feet	600–2000
	Quayside berth controlling depth	Feet	40
	Spud-jacking suitability	Yes or No	Y
Upland Storage	Size	Acres	22–24
	Ground bearing capacity	Metric tons per square meter	10
	Haul route ground bearing capacity	Metric tons per square meter	10
Ro/Ro	Capability	Yes or No	Y
	Width of Ro/Ro berth	Feet	16–130
	Ro/Ro berth and ramp bearing capacity	Metric tons per square meter	10
Cranes	Existing crane lifting capacities	Metric tons	700
	Existing crane height restrictions	Feet	400
Transportation	On-site rail access	Yes or No	Y

Overhead draft was determined by identifying the lowest height of a potentially limiting overhead structure, such as a bridge or overhead power cables, which could limit the passage of a vessel with turbine components traveling between the open ocean and the port. The overhead draft restriction determined for a 15-MW wind turbine scenario is 410 feet (125 m). This height is based on the size of the jacket structure used in the 15-MW scenario. While it may not always be realistic or feasible (technically or economically) to raise a highway, railroad bridge, or power lines, “improve overhead draft to 410 feet (125 m)” may be included as a potential port modification as there is precedent for raising a bridge to accommodate expected vessels (e.g., the 2017-2019 project which raised the Bayonne Bridge 64 feet [19.5 m] from 151 feet [46 m] of clearance to 215 feet [65.5 m] of clearance to accommodate post-Panamax vessels).

It is noted that modifying a highway or railroad bridge would be associated with additional financial, environmental, and socioeconomic impacts. If such a modification were deemed necessary for a specific port, either to support the OSW energy industry or for some other purpose, those additional impacts would need to be studied. For example, it was determined during the port profile evaluation for Providence, Rhode Island, that raising the Pell Claiborne Bridge to accommodate larger vessels was not a feasible option based on the overall size of the bridge and the potential for it to be raised.

The crane capability of a port was evaluated with two criteria: on-site crane capability, which identifies whether the port has existing on-site crane capabilities and is expressed as the lifting capacity (in mt) that the crane(s) at a port can handle; and as crane height restrictions, which defines any height restrictions, if present and made publicly available. If on-site cranes are not present at a port, the value of the on-site crane capability criteria was entered as “No.” Crane height restrictions (due to nearby aviation activity, bridges, etc.) were identified regardless of whether the port had an on-site crane because a port could utilize mobile cranes.

The transportation capability of a port was determined based on the presence of on-site transportation facilities. For the purposes of the port profiles, rail transportation means a commercial or industrial rail service on-site or immediately adjacent to a port that can transport goods, including OSW energy project components. For example, some tower and jacket foundation subcomponents and subassemblies and cable components can be shipped by rail (NREL 2023). It does not include commuter rails and subways used for transporting people. For a port to be classified as having rail transportation, the rail must be located within the port, or immediately adjacent, and accessible to vessels without the use of intermediate truck or additional transportation. Ports with railroad transportation have direct rail access or on-dock rails, typically supported by cranes.

6.2.2 Potential Port Modifications

The existing capabilities for each port were compared to the criteria thresholds identified in Appendix A. If the port did not meet or exceed a threshold, a modification was considered such that, if the port implemented the modification, the port would meet the threshold. The impact assessments for air resources, cultural resources, ecological resources, and socioeconomic resources are based on these hypothetical modification projects.

Each port profile describes the site-specific modifications intended to ensure the port meets the minimum thresholds. Table 6.2-2 identifies the type of construction activities commonly associated with the modifications needed to meet minimum thresholds associated with each capability area. It should be noted that when developers make plans for modifications, existing conditions will need to be confirmed, and investigations will be required in order to ground-truth proposed modifications rather than using publicly available online sources.

Table 6.2-2. Construction activities commonly associated with modifications intended to ensure minimum thresholds are satisfied

Capability Area	Dredging	Pile Driving/ Drilling	Land Clearing and Grading	Fill/Aggregate Placement	Fill/Aggregate Compaction	Paving
Channel Access	•	•				
Quayside Improvements	•	•		•	•	
Storage Capacity			•	•	•	•
Ro/Ro Capability ^a		•	•	•	•	•
Cranes ^b			•	•	•	•

^a Provide Ro/Ro capability; improve Ro/Ro berth width to 8 m; improve bearing capacity of Ro/Ro berth and ramps to 10 mt/m².

^b Provide on-site cranes with 600-ton lifting capability.

When considering the modifications identified in each profile, it is important to note that, if reasonable alternatives are incorporated into a project’s engineering design phase, a port with some capabilities below the minimum thresholds could nonetheless be the preferred port for an OSW energy project. In those cases, benefit-cost analysis might be carried out to determine if port modifications or engineering design modifications are preferred.

6.3 Air Quality

The EPA has promulgated National Ambient Air Quality Standards (NAAQS) to protect human health and welfare. The NAAQS include primary standards designed to protect human health, including the health of sensitive subpopulations such as children and those with chronic respiratory problems. The NAAQS also include secondary standards designed to protect public welfare, including economic interests, visibility, vegetation, animal species, and other concerns not related to human health.

NAAQS have been set for six principal pollutants, referred to as “criteria pollutants.” Criteria pollutants include particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM₁₀), particulate matter with an aerodynamic diameter less than or equal to 2.5 microns (PM_{2.5}), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), ozone (O₃), and lead (Pb).

Unlike the other criteria pollutants, ground-level ozone is usually not directly emitted from a source into the atmosphere. Instead, it is created when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) mix in sunlight. Table 6.3-1 shows the current primary and secondary NAAQS and averaging time for each pollutant. Primary standards are set to protect public health with an added margin of safety, while secondary standards are intended to safeguard environmental concerns, such as Air Quality Related Values (AQRV) and resources that may be negatively impacted by changes in air quality, including visibility, vegetation, water quality, soils, and fish and wildlife. NAAQS are expressed in terms of individual pollutant concentration levels for an associated averaging period.

Table 6.3-1. National Ambient Air Quality Standards

Criteria Pollutant	Averaging Period	Primary NAAQS	Secondary NAAQS
Nitrogen dioxide (NO ₂)	1-hour	0.100 ppm*	N/A
	Annual	0.053 ppm†	0.053 ppm†
Sulfur dioxide (SO ₂)	1-hour	0.075 ppm‡	N/A
	3-hour	N/A	0.50 ppm§
	24-hour	N/A	N/A
	Annual	N/A	N/A
PM ₁₀	24-hour	150 µg/m #	150 µg/m#
PM _{2.5}	24-hour	35 µg/m**	35 µg/m**
	Annual	9 µg/m†, ††	15 µg/m†, ††
Carbon monoxide (CO)	1-hour	35 ppm§	N/A
	8-hour	9 ppm§	N/A
Lead (Pb)	3-month	0.15 µg/m¶	0.15 µg/m ¶
Ozone (O ₃)	8-hour	0.070 ppm§§	0.070 ppm§§

Source: EPA (2024a)

Notes: N/A = not applicable; ppm = parts per million; µg/m = micrograms per cubic meter

* The standard is based on the 3-year average of the 98th percentile of the daily maximum 1-hour average.

† Annual mean value.

‡ The standard is based on the 3-year average of the 99th percentile of the daily maximum 1-hour average.

§ Not to be exceeded more than once per calendar year.

¶ Not to be exceeded.

Not to be exceeded more than once per calendar year on average over 3 years.

** The standard is based on the 3-year average of the 98th percentile of the 24-hour average.

†† The standard is based on the 3-year average of the weighted annual mean.

‡‡ The standard is 9 ppm for areas with an elevation less than 5,000 feet above mean sea level.

§§ The standard is based on the annual fourth-highest daily maximum 8-hour concentration averaged over 3 years.

6.3.1 Attainment Status

An air quality control region, as defined in Section 107 of the Clean Air Act, is a federally designated area in which federal ambient air quality standards must be met. An implementation plan is developed for each air quality control region describing how ambient air quality standards will be achieved and maintained. The EPA designates an area's attainment status on a pollutant-specific basis based on whether an area meets the NAAQS. Areas that meet the NAAQS are termed "attainment areas." Areas that do not meet the NAAQS are termed "nonattainment areas." Areas for which insufficient data are available to determine attainment status are termed "unclassified areas." Areas formerly designated as nonattainment areas that have subsequently reached attainment are termed "maintenance areas."

The attainment status designations appear in 40 CFR Part 81. The attainment status of a region, in conjunction with projected emission rates or emissions increases, determines the regulatory review process for a new project. Table 6.3-2 summarizes the attainment and maintenance status of the county in which emissions from each port will occur.

Table 6.3-2. Attainment and maintenance status

Port Name	County	Attainment Status	NAAQS	Classification	Redesignation to Maintenance	Classification
Albany	Albany County, NY	Attainment / Unclassified	–	–	–	–
Arthur Kill	Richmond County, NY	Nonattainment	8-Hour Ozone (2008)	Severe 15	Carbon Monoxide (1971)	Moderate
			8-Hour Ozone (2015)	Moderate	PM _{2.5} (2006)	Former Subpart 1
Baltimore	Baltimore County, MD	Nonattainment	8-Hour Ozone (2008)	Moderate	Carbon Monoxide (1971)	Moderate
			8-Hour Ozone (2015)	Moderate		
			Sulfur Dioxide (2010)	Moderate		
Bridgeport	Fairfield County, CT	Nonattainment	8-Hour Ozone (2015)	Serious	Carbon Monoxide (1971)	Moderate >12.7ppm
					PM _{2.5} (2006)	Former Subpart 1
Brooklyn	Kings County, NY	Nonattainment	8-Hour Ozone (2008)	Moderate	Carbon Monoxide (1971)	Moderate >12.7ppm
			8-Hour Ozone (2015)	Severe 15	PM _{2.5} (2006)	Former Subpart 1
Morehead City	Carteret County, NC	Attainment / Unclassified	–	–	–	–
New Haven	New Haven County, CT	Nonattainment	8-Hour Ozone (2008)	Severe 15	Carbon Monoxide (1971)	Not Classified
					PM _{2.5} (2006)	Former Subpart 1
NJ Wind Port	Salem County, NJ	Nonattainment	8-Hour Ozone (2008)	Marginal	Carbon Monoxide (1971)	Not Classified
			8-Hour Ozone (2015)	Serious		
Norfolk	Norfolk County, VA	Attainment / Unclassified	–	–	–	–
Portland	Cumberland County, ME	Attainment / Unclassified	–	–	–	–
Portsmouth	Portsmouth County, VA	Attainment / Unclassified	–	–	–	–
Providence	Providence County, RI	Attainment / Unclassified	–	–	–	–
Quonset	Washington County, RI	Attainment / Unclassified	–	–	–	–
Salem	Essex County, MA	Attainment / Unclassified	–	–	–	–
Searsport	Waldo County, ME	Attainment / Unclassified	–	–	–	–
Wilmington	New Hanover County, NC	Attainment / Unclassified	–	–	–	–

Source: EPA (2024b). Nonattainment Areas for Criteria Pollutants (Green Book).

6.3.2 Impacts

This section describes the potential impacts to air quality associated with the construction and operation of the potential modifications described for each port.

6.3.2.1 Construction

Air pollutants disperse into the atmosphere, becoming less concentrated as they travel away from a source of pollution; as a result, they cannot be confined within defined boundaries. Impacts to air quality are discussed in terms of potential construction at each port and emissions of criteria air pollutants and hazardous air pollutants (HAPs). Impacts resulting from construction and O&M activities within each port area can potentially affect resources located outside those areas.

Emissions for each port were divided into construction-related emissions, expected to be temporary, and O&M emissions, expected to occur throughout the operation timeframe. Construction-related emissions would result in air pollutant emissions from equipment exhaust from off-road construction equipment and vehicles, exhaust from on-road construction passenger vehicles, fugitive dust from vehicular travel on paved and unpaved roads, and fugitive dust from earthmoving and general construction activities. Also, construction emissions were calculated by considering construction machinery, vehicles needed for construction, and worker-commuting vehicles. The estimated total criteria pollutant and HAP emissions from potential construction activities at each port are presented in Table 6.3-3.

Table 6.3-3. Estimated total construction emissions in U.S. tons per year

Port Name	CO	NO _x	SO ₂	PM ₁₀	PM _{2.5}	VOCs	HAPs
Albany	12.08	27.41	0.04	1.32	3.84	1.44	0.52
Arthur Kill	17.13	30.56	0.06	1.36	3.45	1.19	0.16
Baltimore	15.09	23.19	0.04	1.27	78.60	8.85	0.45
Bridgeport	7.95	12.92	0.02	0.65	4.88	0.96	0.18
Brooklyn	19.39	24.71	0.06	1.51	7.08	1.79	0.37
Hampton Roads (Norfolk)	20.01	24.47	0.04	1.74	4.89	1.92	0.81
Hampton Roads (Portsmouth)	41.28	69.98	0.13	3.48	55.25	7.8	0.68
Morehead City	98.18	174.14	0.54	9.25	38.65	10.10	2.36
New Haven	10.43	17.59	0.03	0.84	2.38	0.80	0.17
Portland	2.09	5.89	0.01	0.34	1.50	0.43	0.17
Providence	0.21	3.79	0.01	0.16	1.23	0.20	<0.01
Quonset	6.43	10.90	0.02	0.56	47.06	5.18	0.09
Salem	43.62	43.10	0.10	2.18	11.21	2.00	0.53
Searsport	9.49	17.66	0.03	0.90	9.26	1.75	0.13
Wilmington	59.04	89.07	0.16	5.08	46.38	8.25	1.52
Wind Port	121.42	87.79	0.20	5.01	77.46	12.17	1.22

Based on the estimated total construction emissions presented in Table 6.3-3, modifications at Arthur Kill and Wind Port could significantly add to existing emissions, surpassing the NO_x and CO Conformity De Minimis levels respectively.

Under the Clean Air Act, certain areas such as national parks, wilderness areas, or other areas of special national or regional importance are classified as Class I areas and receive a higher level of air quality protection. Potential impacts to Class I areas may require additional reporting to the area's Federal Land Manager for further AQRV analysis. The Federal Land Managers' Air Quality Related Values Work

Group (U.S. Forest Service, National Park Service, and USFWS 2010) guidance recommends summing the project-wide emissions (Q) for NO_x, SO₂, PM₁₀, and sulfuric acid mist (H₂SO₄) based on 24-hour maximum allowable emissions, which are then annualized. This total is divided by the distance (d) in kilometers from the proposed site to the nearest Class I area. If the resulting Q/d value is less than or equal to 10, no further AQRV analysis is required. The formula is as follows:

Equation:

$$\frac{Q \text{ (tpy)}}{d \text{ (km)}} < 10, \text{ no AQRV analysis is required}$$

Where:

Q is the total emissions increase of SO₂, NO_x, PM₁₀, and H₂SO₄ in tpy, based upon the maximum short-term emission rates.

d is the nearest distance to a Class I area in km.

Table 6.3-4 presents the analysis of the ports located within 100 km of Class I areas.

Table 6.3-4. Class I area analysis

Port Name	Closest Class I Area	Q (NO _x , SO ₂ , PM ₁₀) (tpy)	d (km)	Q/d	Q/d < 10
Albany	Lye Brook Wilderness	31.29	72.3	0.43	Yes
Morehead City	Swanquarter Wilderness	213.33	76.5	2.79	Yes
Portland	Presidential Range-Dry River Wilderness	7.40	95.6	0.08	Yes
Searsport	Acadia NP	26.95	40.3	0.67	Yes
Wind Port	Brigantine Wilderness	165.45	94.5	1.75	Yes

Based on the ports closest to Class I areas and their emissions inventories during the construction scenarios analyzed (total emissions for SO₂, NO_x, PM₁₀), Q/d values are significantly less than the threshold of 10. The potential port modifications analyzed would not be expected to have any adverse effects on the nearby Class I areas, and based on the scenario analyzed for this study, no further analysis would be required.

Port-specific air quality analyses and monitoring based on final designs and construction plans would be necessary to assess any localized air quality impacts resulting from construction and dredging activities.

6.3.2.2 Operation and Maintenance

O&M activities would occur after construction is finished and throughout the life of each port. O&M activities may include limited inspections or damage repair, resulting in estimated emissions from routine inspections and repair activities. Emissions from O&M activities are expected to be significantly lower than construction emissions. Emissions of criteria pollutants would occur from maintenance vehicle activities such as worker-commuting and utility trucks (which would be a much smaller number compared to construction) and tugboats and vessels as needed.

Table 6.3-5 displays estimated maximum potential emissions from typical O&M activities. The impacts would not be expected to have a significant impact on air quality, remaining below standard thresholds for any pollutant criteria.

Table 6.3-5. Estimated total operational emissions in U.S. tons per year

Port Name	CO	NO _x	SO ₂	PM ₁₀	PM _{2.5}	VOCs	HAPs
Albany	1.08	1.14	<0.01	0.06	0.08	0.05	0.02
Arthur Kill	0.71	0.63	<0.01	0.02	0.04	0.02	<0.01
Baltimore	0.78	0.63	<0.01	0.02	0.04	0.02	<0.01
Bridgeport	0.73	0.63	<0.01	0.02	0.03	0.01	<0.01
Brooklyn	0.81	0.64	<0.01	0.02	0.04	0.02	<0.01
Hampton Roads (Norfolk)	0.92	0.65	<0.01	0.02	0.06	0.02	<0.01
Hampton Roads (Portsmouth)	0.79	0.63	<0.01	0.02	0.04	0.02	<0.01
Morehead City	0.78	11.52	<0.01	0.02	0.04	0.02	<0.01
New Haven	0.73	0.66	<0.01	0.02	0.02	0.02	<0.01
Portland	0.69	0.70	<0.01	0.03	0.03	0.02	<0.01
Providence	0.71	0.59	<0.01	0.02	0.28	0.04	<0.01
Quonset	0.71	0.99	<0.01	0.05	1.59	0.19	<0.01
Salem	1.87	1.53	<0.01	0.09	3.83	0.44	0.02
Searsport	0.11	0.02	<0.01	<0.01	1.56	0.16	<0.01
Wilmington	0.90	0.64	<0.01	0.02	0.25	0.04	<0.01
Wind Port	1.21	0.77	<0.01	0.04	0.20	0.06	<0.01

The estimated emissions from O&M activities were compared to the De Minimis levels (EPA 2024c) based on each port's County attainment status (EPA 2024b). The minimal values indicate that O&M activities resulting from the port modification scenarios analyzed are unlikely to significantly impact environmental conditions in each port area. Air quality impacts from maintenance of the modified facilities are expected to be minor due to the limited duration and scale of emissions associated with routine maintenance activities.

6.3.2.3 Cumulative Impacts

Construction activities are temporary, so any effects would be short term and largely confined to the construction area of each port. Cumulative impacts from construction would only happen if multiple construction projects occurred simultaneously and in close proximity to each other. Air pollution resulting from each port's O&M would have an impact on air quality. However, this impact would likely be significantly lower for all assessed pollutants compared to the construction phase with some variation based on the number and size of OSW projects utilizing the ports for construction or maintenance activities. The primary effects on air quality, standard pollutants, and HAPs would stem from vehicle emissions and dust disturbance in the construction areas.

Air quality in the area encompassing each port could improve in the long term, as more renewable energy generation would offset emissions from fossil fuel-generated sources. Considering the relatively low potential emissions from the potential modifications and the intermittent nature of the emissions from current and foreseeable impacts, the overall effects of each port could result in a slight long-term positive impact on air quality due to the reduced reliance on fossil fuel-generated energy sources.

6.4 Cultural Resources

6.4.1 Existing Conditions

Cultural resources were identified from SHPO and other state repositories of documented historic and archaeological site and district records. For marine archaeology, records of known historical and archaeological sites and districts were supplemented by records of shipwrecks and other submerged vessels and structures. However, the review of these records was preliminary and does not constitute a full desktop identification effort nor a systematic field survey. These sources included the following:

- State of Rhode Island Historic Property Search (Rhode Island Historical Preservation and Heritage Commission 2024)
- Cultural Architectural Resource Management Archive or CARMA (Maine Historic Preservation Commission 2024)
- Massachusetts Historical Commission Cultural Resources Information System or MACRIS (Massachusetts Historical Commission 2024)
- New York State Cultural Resource Information System or NYSCRIS (New York State Office of Parks, Recreation, and Historic Preservation 2024)
- Connecticut Cultural Resources Inventory System or ConnCRIS (Connecticut Department of Economic and Community Development 2024)
- Medusa Cultural Resources Information System (Maryland Historical Trust 2024)
- New Jersey Geographic Information Network or NJGIN (NJGIN 2024)
- Identification of Historic Resources (New Jersey Historic Preservation Office 2024)
- Virginia Cultural Resource Information System or VCRIS (Virginia Department of Historic Resources 2024)
- Historic Preservation Office Web (HPOWeb) 2.0 database (North Carolina Historic Preservation Office 2024)
- NRHP – National Register Database and Research (National Park Service 2024)
- Office of Coast Survey’s Automated Wreck and Obstruction Information System or AWOIS (NOAA 2024)

For unrecorded historic buildings, structures, and archaeological sites, aerial imagery of the built-environment and modified landscapes were reviewed (Google Earth 2024). Soil and sediment conditions (onshore and offshore) were considered to the extent available—often limited—to address the potential for preserved or previously disturbed depositional environments able to retain archaeological materials. Port and land development histories from publicly available, online sources were reviewed as pertinent to the historic and archaeological contexts of each port area.

Potential for physical impacts from port modifications were assessed within areas where port construction and operations might occur, including the port area and surrounding facility developments, plus water and land accessways. Potential for visual, audible (noise), and atmospheric (haze, odor) impacts, as associated with buildings, cranes, vehicle and vessel traffic, and nighttime lighting, was considered in expanding radii centered on the port area and up to 3 miles outward, in consideration of previous BOEM onshore assessment parameters (e.g., BOEM 2023a). Most port areas lacked potential historic buildings and structures directly in areas of proposed port modification. Most port areas and connected channels and waterfronts had experienced considerable previous industrial development, further limiting archaeological potential in the direct areas of potential port improvement; however, some extended upland yards into greenfield areas or largely undeveloped areas where more intact soils and sediments could occur.

6.4.2 Impacts

Terrestrial Native American and historic archaeological resources, marine archaeological resources, and aboveground historic resources were identified in the areas of potential effects for each port.

Most of the proposed port modification sites are in urban industrial locations near, but not generally part of, important historical areas. Several port areas retained warehouses and other port buildings constructed more than 50 years ago, but only the Portsmouth Marine Terminal area contained buildings and structures (associated with historic railroading) that appear suggestive of types that could prove historically significant with further evaluation.

Similarly, the coastal areas surrounding the evaluated ports served and supported millennia of Native American and centuries of European American utilization that produced archaeological sites in the vicinity. However, most potential port modifications would take place within areas already disturbed or fully industrialized, which greatly limits the potential for intact soils and sediments capable of retaining archaeological materials.

Each port profile gives an overview of nearby cultural resources as documented in the resources listed above, and an estimation of potential effects from described modifications to that port. These estimations are intended as a basis from which to evaluate relative potential impacts to known cultural resources and are based on professional judgement and evaluation of the sources cited. All information and conclusions presented are subject to further consultation with oversight agencies and do not constitute a formal identification or survey effort.

Treatment measures for cultural resources generally seek to avoid, minimize, and mitigate adverse effects from proposed actions. Table 6.4-1 describes the potential impacts to identified resource types and potential mitigation strategies to address these impacts. Should unknown terrestrial or marine archaeological resources be discovered, or unintended impacts to aboveground historic resources occur, during ground, shoreline, seafloor, or riverbed disturbing activities during construction or O&M, activity causing the disturbance should be halted. The appropriate SHPO should be consulted on treatment measures to avoid added impacts to the cultural resource or, if unavoidable, to minimize further impacts and mitigate adverse effects. Should cultural resources identified be found to contain funerary, burial, or human remains, these materials should be protected respectfully, without further disturbance or exposure to harm, and applicable state burial laws should be followed. Best practices would include establishing an unanticipated discovery plan and, where cultural resources are already known in the area of potential effects, a monitoring plan to present procedures for addressing the unanticipated encountering of cultural resource sites and impacts.

Table 6.4-1. Potential impacts to identified cultural resources and potential mitigation strategies

Affected Resource	Primary Impact-Causing Elements	Impact Description	Potential Mitigating Measures
Terrestrial Archaeological	Disturbance of archaeological resources during construction or O&M	Physical removal or destruction of archaeological materials	Halt the cause of disturbance upon discovery of archaeological materials. Consult with the SHPO on treatment to avoid added impacts to the archaeological site or, if unavoidable, minimize further impacts and mitigate adverse effects.
Marine Archaeological	Disturbance of marine archaeological resources during construction or O&M	Physical removal or destruction of archaeological materials	Halt the cause of disturbance upon discovery of archaeological materials. Consult with the SHPO on treatment to avoid added impacts to the archaeological site if determined to be more than 50 years old or, if unavoidable, minimize further impacts and mitigate adverse effects.
Aboveground	Non-physical visual, audible, or atmospheric	Potential effects from increased noise or lights from port developments and traffic to the nearest resources to modification areas	Increase landscaping and screening between the port and historic buildings, structures, and areas to maintain or increase obstruction of visual and noise impacts. Consult with SHPO and stakeholder on additional appropriate mitigation.

6.5 Ecological Resources

6.5.1 Existing Conditions

The existing environmental conditions for each port are described in this section of the port profile. Publicly available information on existing land use, habitats, protected/designated areas (e.g., critical habitat, EFH, Important Bird Areas, wildlife refuges), and protected species were collected and summarized. This information, along with the type and extent of construction activities, was determined to be the information needed to determine impacts to the resource categories. To provide consistency in information across ports, federal databases or databases with national scope were used where available. State databases were also queried to ensure state-protected species and designated areas were identified. For each port profile, the key habitat types and designated places were mapped; these key resources vary by port. Table 6.5-1 lists the primary data sources used; additional specific sources, particularly for state-level information, are provided in each of the port profiles if used.

Existing data was summarized for resources within the potential modification area (where construction would occur), within 1 mile of the port, and within 3 miles of the port. This information allows for an evaluation of different types of injury. For example, permanent habitat losses are likely to occur only within the potential modification area. However, other impacts could occur to habitats and resources off-site. For example, turbidity due to dredging would drift outside the area being dredged. These out-of-area stressors could impact nearby habitats and biota. Noise, both terrestrial and aquatic, is expected to have impacts most distant from the site. In the case of pile driving, noise may increase above baseline levels up to 3 miles from the site.

Table 6.5-1. Description and source of existing conditions data

Resource Category	Data Sources
Land Use / Terrestrial and Wetland Habitats	General land use for all sites was from the National Land Cover Database (Multi-Resolution Land Characteristics Consortium 2021). Wetlands were identified at all sites using both the National Wetlands Inventory database (USFWS 2023a) and the U.S. Geological Survey (USGS) National Hydrography Dataset (USGS 2022). Additional state-specific wetland data was used as available. State-specific resources are provided in the port profiles.
Shoreline Habitats	Shoreline habitats were identified from NOAA Environmental Sensitivity Maps (NOAA 2023a).
Submerged Marine Habitats	Where coverage exists, seafloor benthic habitats were mapped using The Nature Conservancy's (TNC) Mid-Atlantic Benthic Habitats data layer (TNC 2010) and Artificial Reefs Data layer (TNC 2019). Additionally, some states provide spatial data for habitats of interest such as shellfish areas, Submerged Aquatic Vegetation (SAV), and fisheries-related habitat areas. The state-specific references for these are provided in the port profiles, as available.
Designated Habitats / Places	Multiple national and state-level datasets were accessed to identify a variety of types of habitats or places with special ecological designations or protections. The national databases are: • National Audubon Society database on Important Bird Areas (National Audubon Society 2024) • NOAA's EFH Mapper (NOAA 2021) • NOAA's data for North Atlantic Right Whale Seasonal Management Areas (NOAA 2023b) • NOAA's Critical Habitat Mapper for threatened and endangered species. (NOAA 2023c) • NOAA's dataset for Biologically Important Areas for Cetaceans within U.S. Waters (NOAA 2023d) • USFWS Coastal Barrier Resources System Mapper (USFWS 2023b) • USFWS Information for Planning and Consultation (IPaC) tool for Critical Habitat information (USFWS 2024) • USGS Protected Areas Database of the United States (USGS 2024) The state-level databases varied by port. These references are provided in the port profiles, as available.
Endangered Species Act (ESA) Listed Species	Federally endangered and threatened species potentially present in nearby estuarine and oceanic habitats were identified using NOAA's ESA Section 7 Mappers for the Greater Atlantic Region (NOAA 2022). Federally endangered and threatened species in terrestrial habitats were identified using USFWS's IPaC tool (USFWS 2024). Specific species likely to be present were determined based on presence of potential habitat within 3 miles of the port.
Migratory Birds and Eagles	Migratory birds and eagles potentially present in the area were identified using USFWS's IPaC tool (USFWS 2024). Additional information on migratory birds and eagles were sometimes available on state-specific databases. These sources are provided in the port profiles, as available.
Marine Mammals	NOAA's dataset for Biologically Important Areas for Cetaceans within U.S. Waters (NOAA 2023d).
State-Specific Resources	The following publicly available state resources were also considered. Analysis was either applied within the "State-Specific Resources" category or captured within the appropriate resource category above in the table.

Resource Category	Data Sources
Connecticut	• Critical Habitats (Connecticut Department of Energy and Environmental Protection [CEEP] 2023a) • Natural Diversity Database (CEEP 2023b) • Shellfish (CEEP 2023c) • Migratory Waterfowl (CEEP 2024)
Maine	• Aquaculture - AQ Leases (Maine Department of Marine Resources [MDMR] 2018a) • Scallop Management - Scallop Zones (MDMR 2018b) • Eelgrass (MDMR 2018c) • Molluscan Shellfish (MDMR 2019) • Piping Plover and Least Tern Essential Habitat (Maine Department of Inland Fisheries [MDIFW] 2018a) • Roseate Tern Essential Habitat Layer (MDIFW 2018b) • Seabird Nesting Islands (MDIFW 2018c) • Shorebird Areas (MDIFW 2018d) • Endangered Threatened and Special Concern Wildlife Habitat - (Summarized) (MDIFW 2018e) • Tidal Waterfowl and Wading Bird Habitat (MDIFW 2018f) • Endangered and Threatened Fish (MDIFW 2018g) • Maine Heritage Fish Waters (MDIFW 2022)
Maryland	• Managed Fisheries (multiple species layers) (Maryland Department of Natural Resources [MDNR] 2017a, 2017b, 2017c) • Tidal Finfish Adult Habitat (MDNR 2017d) • Sensitive Species Project Review Areas (MDNR 2017e) • Natural Heritage Areas (MDNR 2017f) • Oyster Harvest Reserves (MDNR 2017g) • Public Shellfishery Areas (MDNR 2017h) • Wetlands - Polygon Special State Concern (MDNR 2017i) • Oyster Sanctuaries (MDNR 2019) • SAV (MDNR 2023)
Massachusetts	• Diadromous Fish (multiple layers) (Massachusetts Division of Marine Fisheries [MDMF] 2023a) • Eelgrass Phase 6: 2019-2023 (MDMF 2023b) • Shellfish Suitability Areas (MDMF 2011) • Areas of Critical Environmental Concern (Massachusetts Department of Conservation and Recreation 2009) • Massachusetts Natural Heritage & Endangered Species Program [MNHESP] Estimated Habitats of Rare Wildlife (MNHESP 2021a) • MNHESP Priority Habitats of Rare Species (MNHESP 2021b) • MNHESP Natural Communities (MNHESP 2023)
New Jersey	• Tidelands Polygon Activity Features (New Jersey Department of Environmental Protection [NJDEP] 2024) • Natural Heritage Priority Sites (NJDEP 2023) • Terrestrial Wildlife Habitat Cores and Corridors (NJDEP 2018) • Conservation Focal Areas Version 1.1, Delaware Bay Landscape Region (NJDEP 2017)
New York	• Hudson Valley Forest Condition Index (New York Department of Environmental Conservation [NYDEC] 2022a) • Hudson Valley Significant Biodiversity Areas (NYDEC 2022b) • Natural Heritage Important Areas (NYDEC 2024) • Significant Coastal Fish and Wildlife Habitats (NYDEC 2021) • State Regulated Freshwater Wetlands (NYDEC 2023)

Resource Category	Data Sources
North Carolina	• Estuarine Benthic Habitat Mapping Areas (North Carolina Division of Marine Fisheries [NCDMF] 2023) • Natural Heritage Program Natural Areas (North Carolina Natural Heritage Program [NCNHP] 2024) • SAV 2019-2020 Mapping (NCDMF 2022) • Biodiversity and Wildlife Habitat Assessment (NCNHP 2023)
Rhode Island	• Bird Species (Rhode Island Department of Environmental Management [RIDEM] 2023a) • Shellfish Harvest Restrictions (RIDEM 2023b) • Natural Heritage Areas (2023) (RIDEM 2024) • SAV in RI Coastal Waters (2021) (University of Rhode Island Environmental Data Center 2024)
Virginia	• Coastal Avian Protection Zones (Virginia Department of Environmental Management 2020) • Additional state data contributed and captured under the federal layers

6.5.2 Impacts

Anticipated routes of effect were evaluated and summarized in each port profile for the 11 ecological resource categories typically assessed during NEPA reviews for proposed OSW development projects, as discussed in Section 5.3.3. Expected impact-causing elements were evaluated with respect to the interaction of the site-specific modifications identified for each port and the existing ecological conditions and resources potentially present, as documented in data sources listed above. Each port profile briefly describes the types of impact identified as potentially occurring as a result of proposed port modifications and expected routes of effect. In general, if an impact-causing element was not expected to contribute significantly or at all to an expected impact, it was not individually identified in this portion of the port profiles. For example, while water quality impacts can occur due to stormwater runoff, dredge material dewatering, and resuspension of contaminated sediments, the primary impact to water quality is likely to be suspended sediments/turbidity due to in-water construction activities, primarily dredging, if these activities are occurring. Additionally, although accidental releases of oil and gas products used for construction equipment, routine operations vehicles, and vessels making port call may occur, thereby potentially affecting the sediment quality, sediment quality overall is not expected to materially change as a result of any potential port development activities described. The primary potential impacts and those that were most likely to differ between ports are listed in Table 6.5-2.

Table 6.5-2. Evaluation criteria for each ecological resource

Affected Resources	Final Evaluations of Resource Impact
Water Quality	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, dewatering and stormwater discharges, and soil disturbance and erosion. The impact will vary depending on project-specific details such as affected acreages and specific construction activities, especially aggregate dumping, fill placement and compaction, blasting, drilling, pile driving, and dredging. Potential impacts may range from dredging and dewatering along the shoreline to large-scale dredge activities such as federal channel widening.
Sediment Quality	No identified impact-causing elements are expected to materially modify sediment quality; however, accidental releases related to construction machinery and vessels making port during operations could have temporary and local effects.

Affected Resources	Final Evaluations of Resource Impact
Terrestrial Habitats	Primary impact-causing elements due to potential construction activities include soil disturbance, erosion, and habitat alteration. The impact will vary depending on project-specific details such as affected acreage, available adjacent habitats, and specific construction activities, especially fill placement and compaction, land clearing, blasting, drilling, and pile driving. Potential impacts may range from temporary effects on isolated habitats or those surrounded by developed or industrial land uses to permanently altered habitats or effects on designated critical habitat or important wildlife areas.
Aquatic Habitats	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, dewatering and stormwater discharges, and aquatic habitat alteration. The impact will vary depending on project-specific details such as affected acreage, available adjacent habitats, and specific construction activities, especially aggregate dumping, fill placement and compaction, land clearing, blasting, drilling, pile driving, and dredging. Potential impacts may range from temporary effects on isolated habitats or those surrounded by developed or industrial land uses to permanently altered habitats or effects on designated critical habitat or important wildlife areas.
Shoreline	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, and shoreline type alteration. The impact will vary depending on project-specific details such as existing shoreline type, adjacent shorelines and surrounding land uses, and specific construction activities, especially aggregate dumping, fill placement and compaction, land clearing, and dredging. Potential impacts may range from development along shorelines with existing heavy armoring to alterations or impacts to shorelines that are natural shorelines or are of a unique nature.
Submerged Marine Habitats / Benthic Resources	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, dewatering and stormwater discharges, and aquatic habitat alteration. The impact will vary depending on project-specific details such as affected acreage, available adjacent habitats, and specific construction activities, especially aggregate dumping, fill placement and compaction, land clearing, blasting, drilling, pile driving, and dredging. Potential impacts may range from temporary effects on habitats such as ubiquitous mud or muck bottoms to temporary or permanent impacts to unique resources such as seagrass, artificial reefs, shellfish beds, or sand source bottoms.
Fish and Invertebrates	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, dewatering and stormwater discharges, aquatic habitat alteration, aquatic noise, and vessel/equipment interaction. The impact will vary depending on project-specific details such as expected occurrence of ESA or EFH species, commercially or recreationally important species, surrounding land use, and specific construction activities, especially aggregate dumping, fill placement and compaction, land clearing, blasting, drilling, pile driving, and dredging. Potential impacts are expected to be greater at locations that are known to support ESA or other protected/managed species and where construction activities that would generate pulsive noises (pile driving or blasting) are used.
Marine Mammals	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, dewatering and stormwater discharges, aquatic habitat alteration, aquatic noise, and vessel/equipment interaction. The impact will vary depending on project-specific details such as expected occurrence of ESA-protected species, surrounding land use, and specific construction activities, especially aggregate dumping, fill placement and compaction, land clearing, blasting, drilling, pile driving, and dredging. Potential impacts are expected to be greater at locations that are known to support ESA or other protected/managed species and where construction activities that would generate pulsive noises (pile driving or blasting) are used.

Affected Resources	Final Evaluations of Resource Impact
Sea Turtles	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, dewatering and stormwater discharges, aquatic habitat alteration, aquatic noise, and vessel/equipment interaction. The impact will vary depending on project-specific details such as expected occurrence of ESA-protected species, surrounding land use, and specific construction activities, especially aggregate dumping, fill placement and compaction, land clearing, blasting, drilling, pile driving, and dredging. Potential impacts are expected to be greater at locations that are known to support ESA or other protected/managed species and where construction activities that would generate pulsive noises (pile driving or blasting) are used.
Birds and Bats	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, terrestrial and aquatic habitat alteration, terrestrial and aquatic noise, and lighting. The impact will vary depending on project-specific details such as expected occurrence of ESA-protected species, the surrounding land use, and specific construction activities, especially land clearing, aggregate dumping, fill placement and compaction, blasting, drilling, and pile driving. Potential impacts may range from development within an already developed or industrial area with minimal habitat alteration to development in areas that would require the conversion of green space (forested, grasslands or wetlands), areas adjacent to protected areas or critical habitats, or areas that support ESA or other protected/managed species.
Other Terrestrial Biota	Primary impact-causing elements due to potential construction activities include sediment suspension and deposition, terrestrial and aquatic habitat alteration, terrestrial and aquatic noise, and lighting. The impact will vary depending on project-specific details such as expected occurrence of ESA-protected species, the surrounding land use, and specific construction activities, especially aggregate dumping, fill placement and compaction, blasting, drilling, pile driving, and dredging. Potential impacts may range from development within an already developed or industrial area with minimal habitat alteration to development in areas that would require the conversion of green space (forested, grasslands or wetlands), areas adjacent to protected areas or critical habitats, or areas that support ESA or other protected/managed species.

6.6 Socioeconomics

6.6.1 Existing Conditions

Existing socioeconomic conditions are characterized using the publicly available data and sources described in Table 6.6-1. To provide consistency, where possible, sources that provided information for all of the ports on a specific resource were used. As appropriate, port-specific sources were used to provide detail where needed. Where a consistent source was unavailable or where special considerations were made, it is noted in the port profile.

Socioeconomic effects are considered either within a 5-mile radius from the center of each port, at the county level, or at the Micropolitan or Macropolitan Statistical Area (MSA) level. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) generally dissipate within the 3-mile radius used in other sections of this report; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger MSA level or at the county level.

- A 5-mile radius was determined to capture most disturbance-related impacts such as noise or light emissions.
- County-level considerations often included impacts that could extend beyond the 5-mile radius where physical impacts dissipate but would still have primary local effects. These might include impacts to small businesses or terrestrial traffic congestion.
- MSAs consist of one or more counties with a high degree of social and economic integration, as measured by commuter ties and with a core urban area. The MSA was often used when considering impacts that could have far-reaching economic effects.

Table 6.6-1. Description and source of existing conditions data gathered

Topic	Data Source(s)
Land Use	Land use within 5 miles of the ports is determined using the Esri Land Cover layer, Sentinel-2 10-Meter Land Use/Land Cover, as well as satellite imagery from Google Maps and Google Earth (Esri 2023; Google Maps 2024).
Infrastructure	Major infrastructure within 5 miles of the ports is identified using the Esri Land Cover layer, Sentinel-2 10-Meter Land Use/Land Cover, as well as satellite imagery from Google Maps and Google Earth (Esri 2023; Google Maps 2024).
Special Use Areas	Special use areas are identified using the Military Installations, Ranges, and Training Areas layer in ArcGIS Online as well as satellite imagery from Google Maps and Google Earth (ArcGIS Online 2020).
Visual	Visibility of port areas is assessed using satellite imagery and street views from Google Maps and Google Earth (Google Maps 2024).
Noise	Noise is evaluated using the USDOT National Transportation Noise Map (USDOT 2022).
Air Quality	Air quality information is obtained using the EPA's environmental and socioeconomic indicator data. Information is reported for air quality indicators as well as the asthma risk information from health indicators.
Traffic (terrestrial)	A traffic rating obtained using the EPA's traffic proximity indicator.
Maritime Navigation	Locations of the nearest marine highways is identified using the USDOT's marine highways dataset (USDOT 2018).
Commercial Shipping	Information on commercial shipping is specific to each port. Unique references can be found in the port profiles.
Commercial Fishing	Commercial fishing information is obtained from NOAA Fisheries' Fisheries One Stop Shop landing data and Community Social Vulnerabilities Indicators Tool (NOAA 2020a, 2020b).
Recreational Fishing	Recreational fishing information is obtained from NOAA Fisheries' Community Social Vulnerabilities Indicators Tool (NOAA 2020b).
Recreational Resources	Recreational resources surrounding the ports are identified using the USGS's Protected Areas Database of the United States (USGS 2024) as well as satellite imagery from Google Maps and Google Earth (Google Maps 2024).
Tourism	Information on the tourism industry is obtained from the U.S. Census Bureau's (USCB's) American Community Survey (USCB 2023).
Housing and Lodging	Housing information is obtained from the USCB's American Community Survey (USCB 2023).
Population	Population information is obtained from the USCB's American Community Survey for the nearest MSA or county (USCB 2023).
Labor Force and Employment	Labor and Employment data are obtained from the USCB's American Community Survey (USCB 2023).
Income Levels	Income information is obtained from the USCB's American Community Survey for the nearest MSA or county (USCB 2023).
Community Cohesion	Community cohesion index percentiles are reported from Chetty et al. (Chetty et al. 2022).

Topic	Data Source(s)
Government Revenues	Information on government revenues is obtained from local taxing authorities and is specific to each port.
Public Services	Public services information is obtained from the EPA's community features database and employment in the "educational, health care, and social services" industry is obtained from the USCB's American Community Survey for the nearest MSA or county (USCB 2023).

6.6.2 Impacts

Table 6.6-2 illustrates the linkages between the socioeconomic topics considered, the impact-causing elements associated with port modifications, and potential socioeconomic effects.

Table 6.6-2. Socioeconomic topics, impact-causing elements, and potential effects

Topic	Impact-Causing Elements	Potential Effects
Land Use	Space use conflicts.	Use of space for new port infrastructure has the potential to displace existing uses.
Infrastructure	Space use conflicts.	Use of space for new port infrastructure has the potential to displace existing infrastructure.
Special Use Areas	Space use conflicts; vessel/equipment interaction.	Military areas may have special additional requirements for the use of some areas. Airports may have height or lighting restrictions near runways.
Visual	Highly visible construction infrastructure or other equipment.	Tall cranes, assembled wind components, or other equipment may be visible from long distances. In some settings this could alter the existing viewshed.
Noise	General construction activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around ports. During operation, noise would generally be similar to typical port operation noise.
Air Quality	Air emissions.	Emissions from construction and operation may degrade local air quality. Renewable projects are likely to bring about a net reduction in global greenhouse gas emissions.
Traffic (terrestrial)	Project-related congestion.	The addition of workers during construction and operation could create adverse impacts on traffic flow.
Maritime Navigation	Increased maritime traffic.	The additional vessel traffic required during construction and operation for delivery of materials or equipment may impact existing port use.
Commercial Shipping	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic may be required during construction and operation, creating the potential for shipping congestion.
Commercial Fishing	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Adverse impacts to stocks near port modification activities could impact commercial fishing. Competition for limited port infrastructure or space could adversely affect commercial fishing.
Recreational Fishing	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Adverse impacts to stocks near port modification activities could impact recreational fishing. Competition for limited port infrastructure or space could adversely affect recreational fishing.

Topic	Impact-Causing Elements	Potential Effects
Recreational Resources	Air and noise emissions; visual alterations; terrestrial traffic; highly visible construction or operational infrastructure.	Air and noise emissions may extend to nearby recreational areas, potentially affecting the natural ambiance and experience for visitors and boaters. Additionally, highly visible construction or operational infrastructure would have the potential to impact scenic views.
Tourism	Air and noise emissions; visual alterations; terrestrial traffic; highly visible construction or operational infrastructure; in-migration of project workers.	Air and noise emissions or visual alterations could degrade the quality of some tourist activities. Additionally, highly visible construction or operational infrastructure would have the potential to impact scenic views. The addition of workers during construction and operation could impact tourism if workers fill available housing.
Housing and Lodging	In-migration of project workers.	Project workers may increase demand for housing and lodging.
Population	Potential in-migration associated with employment opportunities.	The additional demand for workers during construction and operation could draw workers to move to the area.
Labor Force and Employment	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	Hiring for the required workforce during construction and operation would improve local employment.
Income Levels	Increased labor demand puts upward pressure on wages.	An increased workforce at prevailing wage levels may alter income levels.
Community Cohesion	In-migration of project workers. Infrastructure that separates communities physically or socially. Divergent opinions related to OSW.	New infrastructure may physically displace or geographically divide communities. Differences of opinion related to OSW may be exacerbated by modification-related activity.
Government Revenues	Increased income and sales tax revenue.	Modification-related taxes may contribute revenue at the state and local level.
Public Services	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels may increase demand for public services. Increased construction activity may increase incidence of accidents.

7 Conclusions

This study provides BOEM an updated understanding of Atlantic coast port facilities, the modifications that may be necessary at those ports if they are to fully support OSW projects, the environmental and socioeconomic impacts that may result from those modifications, and potential mitigating actions. Information gathered through existing experiences, a review of the available literature, a review of publicly available information, and input from industry experts, served as the basis for this study.

Since the development of the initial study in 2016, planning and development of OSW projects has progressed substantially. Additionally, port requirements have changed due to the increasing size of wind tower components. The initial study reviewed requirements for 4-MW, 6-MW, and 8-MW turbines, whereas the current and projected turbine sizes analyzed in this report are 12 MW, 18 MW, and 21 MW. The increased size of components results in a revised list of ports where future modifications may be appropriate as well as modified estimates of the scale and magnitude of the impacts likely to be associated with those modifications.

The study deliverables provide documentation to support future NEPA reviews of offshore renewable energy actions and to aid in the project-specific assessment of the environmental and socioeconomic

impacts associated with the port modifications that may be necessary to support proposed Atlantic OCS OSW energy development projects.

The primary activities considered for this study were associated with a) the modification of ports to support the manufacturing, fabrication, staging, and installation of extremely large and heavy components associated with OSW energy projects and b) facilitating access and docking of vessels that transport and install them. OSW staging ports are anticipated to require significant storage and laydown space with adequate ground bearing capacity, equipment to transport large cargo within the port, cranes with heavy-lift capacity, sufficient quayside space to accommodate transportation and installation vessels, and sufficient overhead clearance along waterbodies leading to ports to allow these vessels to reach the port.

7.1 Port Modifications

Table 7.1-1 provides a summary of potential modifications that were identified at each of the 16 ports that were evaluated. The potential modifications are based on those included in publicly available planning documents, existing conceptual designs, or modifications identified by this study's authors.

As shown in Table 7.1-1, the most common potential modifications include “new berth construction” (13 of 16 ports), “provide mobile crane” (13 of 16 ports), “quayside bearing capacity improvement” (12 of 16 ports), “storage area” and “haul route bearing capacity improvements” (14 and 12 of 16 ports, respectively), and “modify road” (12 of 16 ports). Although Ro/Ro loading and unloading is a common method, it was not identified as a potential modification at most ports. This is because ports often already have adequate Ro/Ro capabilities and vessels with built-in ramps are becoming more common.

Modifications related to increasing air draft at the port (lifting bridges, utility lines, or other impediments) were also not commonly identified for port buildouts. This may be because developers (and the ports themselves) have already screened out locations that would require significant air draft modifications.

While cranes are critical to port use, it appears from the survey of proposed potential modifications that the current focus is on using mobile cranes at the quayside vs. fixed, in-place cranes (e.g., ringer cranes). This is likely due to mobile cranes being far more flexible in their use, location, and ability to move components via “pick and carry” methods, which increases the efficiency of moving components around the port. Although most ports modifications note mobile vs. fixed cranes, the means and methods of preparing the quayside for a heavy-lift crane are generally similar, though they likely vary in the scale (i.e., area) of ground improvements.

Finally, the size of a port's component storage area is important, and most ports included in the study (13 of 16) proposed expansions of upland storage area. Commercial ports will need to weigh whether these expansions can also serve a port beyond use for only OSW construction activities.

Table 7.1-1. Summary of potential port modifications

Potential Modifications	Albany, NY	Arthur Kill, NY	Baltimore, MD	Bridgeport, CT	Brooklyn, NY	Morehead City, NC	New Haven, CT	NJ Wind Port, NJ	Norfolk, VA	Portland, ME	Portsmouth, VA	Providence, RI	Quonset/Davisville, RI	Salem, MA	Searsport, ME	Wilmington, NC
Access																
Air Draft Improvement (Bridges, Utility Lines)				X							X		X	X		
Channel Widening/ Deepening	X	X		X							X		X	X		
New Berth Construction	X	X		X	X	X	X	X			X	X	X	X	X	X
Cranes																
Provide Fixed Crane															X	
Provide Mobile Crane	X	X		X	X	X	X	X	X	X	X	X		X		X
Reduce Crane Height Restrictions																X
Quayside																
Quayside Bearing Capacity Improvement	X	X	X	X	X			X		X	X	X	X	X		X
Quayside Length Expansion												X				
Quayside Seabed Bearing Capacity Improvement		X			X			X			X					
Roll-On/Roll-Off																
Provide Ro/Ro Capability			X			X					X			X		
Ro/Ro Berth (Width/Air Draft)																
Ro/Ro Berth Bearing Capacity Improvement			X			X					X					
Storage																
Haul Road Bearing Capacity Improvement	X	X	X	X	X	X	X	X		X		X	X		X	
Storage Area Bearing Capacity Improvement	X	X	X	X	X	X	X	X		X	X	X	X		X	X
Storage Area Size Expansion (Open or Covered)	X	X	X		X	X		X	X	X	X	X	X		X	X
Transportation Infrastructure																
Modify Rail Line	X				X	X			X							
Modify Road (widen, turning, bearing)	X	X	X	X	X	X		X	X	X		X	X		X	

7.2 Potential Environmental and Socioeconomic Impacts

The environmental and socioeconomic impacts of port modifications, while following broad patterns, are specific to each location and depend upon the changes brought about by specific port modifications and the existing conditions around each potential modification area. Table 7.2-1 summarizes the estimated changes likely to be brought about by the OSW-related modifications described in detail in the port profiles for each of the 16 ports.

These estimated changes do not represent the results of an impact assessment for any specific project and cannot be regarded as a precise measure of impacts; however, they are indicative of the impact types likely to be of concern. Should a port begin the permitting process for any specific modification, additional investigation should be made to further understand the nature and extent of potential impacts and identify potential mitigating actions.

Projected emissions generated during construction and operation provide insight into the potential for port modifications to contribute to local and regional air quality degradation and climate change.

The density of cultural resources within 3 miles of a port may be an indication of potential impacts or the likelihood of unanticipated discoveries; however, site design and specific building demolition or avoidance may be more relevant factors.

The amount of dredging required is indicative of the potential for impacts to submerged cultural resources, the potential for adverse impacts to ecological resources, and the potential for adverse impacts to communities who rely on or enjoy the aquatic resources that may be affected. Similarly, the total impact area may be an indication of potential terrestrial and overall habitat loss; however, the port modification location considered here with the largest overall area of impact, Baltimore, would impact mostly developed land, whereas Searsport, although disturbing a much smaller area, would break ground in a new, undeveloped location.

Pile driving during construction is the primary potential cause of noise impacts and has the potential to impact both environmental and socioeconomic resources. Locations in which OSW-related modifications would not require pile driving, such as Norfolk, Baltimore, and Arthur Kill, would avoid this impact.

The number of people living within 5 miles of the port and the current state of various socioeconomic indicators in the area surrounding the port are indicators of the potential for direct disturbance-related socioeconomic impacts. A greater number of people living in proximity to the potential modification area means more people would be exposed to air emissions, noise emissions, and viewshed changes caused by construction or operation; however, a large nearby population would also mitigate potential adverse impacts such as unsustainable increases in demand for housing or public services.

Table 7.2-1. Summary of potential environmental and socioeconomic impact indicators

Port	CO ₂ Emissions During Construction (MTpy)	CO ₂ Emissions During Operation (MTpy)	Air Quality Estimated Region of Influence	Total Cultural Resources Within 3 Miles	Dredging Area (acres)	Total Impact Area (acres)	Pile Driving Max Duration (months)	Population Within 5 Miles
Albany, NY	10,225.1	474.5	19.5	2,232	0.0	79.7	15	138,168
Arthur Kill, NY	7,950.1	256.3	59.2	765	18.0	56.0	0	303,971
Baltimore, MD	9,177.2	263.1	68.7	94	0.0	387.0	0	78,973
Bridgeport, CT	4,504.7	250.8	46.6	2,043	105.2	124.4	6	251,137
Brooklyn, NY	10,129.5	266.6	46.8	5,138	4.0	137.9	11	2,207,648
Morehead City, NC	52,589.9	256.0	85.8	696	22.8	130.4	6	18,591
New Haven, CT	5,277.9	270.5	53.5	1,925	2.8	23.8	6	358,323
NJ Wind Port, NJ	33,955.7	368.3	77.5	3	89.9	297.9	9	6,288
Norfolk, VA	11,439.7	278.1	79.1	1,095	0.0	9.5	0	237,187
Portland, ME	2,781.0	286.3	11.0	1,061	0.0	10.5	6	107,063
Portsmouth, VA	19,692.3	264.3	71.5	1,095	59.2	136.0	6	237,187
Providence, RI	736.3	236.2	46.8	73	2.1	35.8	6	400,342
Quonset/Davisville, RI	1,168.2	290.0	69.6	52	120.0	168.5	3	31,305
Salem, MA	16,888.8	691.2	19.5	4,479	21.0	60.5	20	214,614
Searsport, ME	11,154.0	13.8	12.0	141	0.0	96.0	11	3,966
Wilmington, NC	29,507.6	276.4	91.5	2,979	4.1	88.2	6	105,124

Note: The levels of CO₂ estimated for Morehead City, New Jersey, reflect the plans in place to construct multi-use facilities to support OSW as well as automotive uses. MTpy = metric tons per year.

7.3 Further Research Needs

This study developed a set of criteria defining the port requirements (e.g., vessel access, lifting capabilities, transportation infrastructure) necessary to support OSW construction and operations; identified and classified Atlantic coast ports that could potentially service proposed areas for the OSW energy industry; identified potential modifications needed to support the industry at these ports; and summarized potential impact-causing elements, potential environmental and socioeconomic impacts, and mitigation measures commonly associated with the port modification activities identified.

While implementing the study, the following research needs were identified.

1. There is no publicly available data set that consistently characterizes port capabilities and identifies port modifications already in progress. The benefits and costs of developing and updating such a database should be considered. Similarly, existing seabed and quayside load bearing capacity is often not known by the ports themselves; the benefits and costs of developing such data should be considered.
2. This study identified a set of modifications that would enable a port to fully support OSW energy development. An alternative premise is that OSW energy projects should be modified to conform to current port capabilities. An analysis that identifies the trade-offs between port and project modifications and technological improvements to OSW components that may preclude modifications would provide additional insight into OSW energy development.
3. If a port actually begins the permitting process to support modifications, further studies and investigations are highly recommended. In addition to traditional NEPA-driven information gathering, discussions with port operators who have already made, or are in the process of making, OSW-related modifications would be insightful.
4. Mitigation such as habitat creation or restoration is often implemented when a project removes or changes a natural habitat, but information characterizing the long-term success of those mitigation projects is often missing. Additional studies characterizing the long-term performance of habitat mitigation projects in and around ports would improve project designers' ability to predict the "net impact" of port modification projects.

7.4 Recommendations

There are 360 commercial ports throughout the United States today handling various types of cargo (U.S. Coast Guard 2018). *The Identification of Port Modifications and their Environmental and Socioeconomic Consequences: 2024 Update* highlighted 16 ports along the Atlantic coast that have at least some capability to support OSW energy development. As noted, selection of the 16 ports for this evaluation considered regionalization (i.e., a roughly equal distribution along the Atlantic coast), existing publicly available interest in development (e.g., ports where conceptual designs for modifications were made available for evaluation), and location relative to communities that would be impacted by port modifications. The 16 ports for which profiles were developed include ports that were considered suitable and likely candidates for OSW energy support; however, they do not necessarily represent the best ports for OSW energy support, ports recommended for use by BOEM, or the only ports capable of supporting OSW. When OSW energy project developers identify and select ports for future potential OSW energy projects, other options may and should be considered.

While this study identified minimum port capabilities required to support specific elements of OSW energy development, the most influential factor determining whether a port will actually be used by an OSW developer may be the proximity of the port to the OSW energy development site. As OSW industry participants, regulators, and port authorities consider modifying ports to support OSW energy development, it is important to consider the distance between existing and potential OSW project sites,

the port contemplating modification, and other ports likely to compete for the same OSW projects. Further, if OSW project engineers consider port capabilities during front-end design, port facilities with capabilities below the specified minimum requirements can be viable options.

Once the decision to modify a port is made and a project moves into the design phase, OSW developers should consult the extensive existing experience of ports both in the United States and around the world that already support OSW projects; many have implemented modifications in environmental and social settings similar to those currently being contemplated (e.g., New Bedford, Massachusetts; New London, Connecticut). Doing so will enable identification of procedures, modifications, and mitigation methods that have been successful.

Notwithstanding the preceding recommendation, the OSW energy industry is evolving at a rapid pace and concepts that may be appropriate when a port modification is being designed may not be fully appropriate by the time construction begins. While potential port expansions intended to support OSW energy development should be viewed and understood from all levels—port authorities, permitting agencies, port user groups, and surrounding communities—it will be critical for all parties involved to be flexible in their approaches over the course of a project.

8 References

8.1 Introduction

None.

8.2 Expert Discussions

None.

8.3 Required Port Characteristics

Al-Ahmar E, Benbouzid M, Amirat Y, Benelghali S. 2008. DFIG-Based Wind Turbine Fault Diagnosis Using a Specific Discrete Wavelet Transform. Proceedings of the 2008 International Conference on Electrical Machines, ICEM'08. 1 - 6. 10.1109/ICELMACH.2008.4800033.

American Association of Port Authorities. 2013. *U.S. Public Ports Facts*.

Atlantic Wind Transfers. 2022 Aug 30. Atlantic Wind Transfers Orders Six Chartwell EPA Tier 4 Compliant CTV's [press release]. [accessed December 2024].
<https://www.atlanticwindtransfers.com/recent-press>.

[BOEM] Bureau of Ocean Energy Management. 2016. *The Identification of Port Modifications and the Environmental and Socioeconomic Consequences*. OCS Study BOEM 2016-034. April 2021.

[BOEM] Bureau of Ocean Energy Management. 2020. *Atlantic Science Year in Review 2019*. Bureau of Ocean Energy Management Office of Renewable Energy Programs.

[BOEM] Bureau of Ocean Energy Management. 2021. *Comparison of Environmental Effects from Different Wind Turbine Foundations*. OCS Study BOEM 2021-053. August 2021.

- [BOEM] Bureau of Ocean Energy Management. 2024a Oct 1. BOEM Approves Construction and Operations Plan for Atlantic Shores South Offshore Wind Projects [press release]. [accessed March 28, 2025]. <https://www.boem.gov/newsroom/press-releases/boem-approves-construction-and-operations-plan-atlantic-shores-south>.
- [BOEM] Bureau of Ocean Energy Management. 2024b Dec 3. BOEM Approves Construction and Operations Plan for Maryland Offshore Wind Project [press release]. [accessed March 28, 2025]. <https://www.boem.gov/newsroom/press-releases/boem-approves-construction-and-operations-plan-maryland-offshore-wind>.
- [BOEM] Bureau of Ocean Energy Management. 2025. BOEM Image Gallery – Flickr.com. [accessed March 6 2025]. <https://www.flickr.com/photos/boemgov/>.
- Craneaholics. 2024. *ESEASA Takes Delivery of the First LR 1700-1.0W Narrow-Track Crawler in Latin America*. [accessed November 2024]. <https://craneaholics.us/blogs/crane-news/eseasa-takes-delivery-of-the-first-lr-1700-1-0w-narrow-track-crawler-crane-in-latin-america>.
- Cruise Lines International Association. 2024. State of the Cruise Industry Report. [accessed December 2024]. <https://cruising.org/-/media/clia-media/research/2024/2024-state-of-the-cruise-industry-report-updated-050824-web.ashx>.
- DNV GL. 2014. Assessment of Ports for Offshore Wind Development in the United States. Prepared for the U.S. Department of Energy.
- Durakovic A. 2021. Siemens Gamesa Receives Firm Order for Two US Offshore Wind Farms. OffshoreWIND.biz. [accessed October 18, 2024]. <https://www.offshorewind.biz/2021/10/01/siemens-gamesa-receives-firm-order-for-two-us-offshore-wind-farms/>.
- Worth J. 2023. *Port Cranes: Functions, Types and Sizes*. Igus Engineer’s Toolbox. 22 March 2023. [accessed 10 December 2024]. <https://toolbox.igus.com/4169/port-cranes-functions-types-and-sizes>.
- Janocha MJ, Ong MC, Lee CF, Chen K, Ye N. 2024. Reference Power Cable Models for Floating Offshore Wind Applications. *Sustainability* 2024 (16):2899.
- LEANWIND. 2017. Driving Cost Reductions in Offshore Wind. The LEANWIND Project Final Publication. [accessed November 2024]. <https://windeurope.org/wp-content/uploads/files/about-wind/reports/LEANWIND-Driving-cost-reductions-in-offshore.pdf>.
- Liebherr. 2024. LHM 180 Mobile Harbor Crane. [accessed December 2024]. <https://www.liebherr.com/en-us/p/lhm180-4433166>.
- Lewis P. 2024. Subsea Cabling: A Growing Fleet. *Maritime Reporter*. August 2024 Edition.
- Malhotra S. 2007. Design and Construction Considerations for Offshore Wind Turbine Foundations in North America. 10.1115/OMAE2007-29761.
- Maslin E. 2022. *Storage Space a Challenge for Offshore Wind Turbine Manufacturers*. [accessed November 2024]. <https://www.maritimeprofessional.com/news/storage-space-challenge-offshore-wind-376993>.

- Mathern A, von der Harr C, Marx S. 2021. Concrete Support Structures for Offshore Wind Turbines: Current Status, Challenges, and Future Trends. *Energies* 2021 (14). <https://doi.org/10.3390/en14071995>.
- Moffat & Nichol. 2021. Maine Department of Transportation: Offshore Wind Port Infrastructure Feasibility Study, Concept Design Report. Prepared for Maine Department of Transportation.
- National Marine Manufacturers Association. 2024. Key recreation boating facts. [accessed December 2024]. <https://www.nmma.org/advocacy/economic-impact/recreational-boating>.
- New Jersey Economic Development Authority. 2023. Identification and Assessment of Additional Potential Offshore Wind Ports in New Jersey. Prepared by Ramboll for New Jersey Economic Development Authority. March 3, 2020.
- [NOAA] National Oceanic and Atmospheric Administration. 2019. Fisheries of the United States 2019. [accessed December 2024]. <https://media.fisheries.noaa.gov/2021-05/fus-2019-fact-sheet-v4.2-webready.pdf?null>.
- [NREL] National Renewable Energy Laboratory. 2023. A Supply Chain Road Map for Offshore Wind Energy in the United States. [accessed March 2025]. <https://www.nrel.gov/docs/fy23osti/84710.pdf>.
- [NREL] National Renewable Energy Laboratory. 2024. Offshore Wind Market Report – 2024 Edition. Technical Report NREL/TP-5000-90525. August 2024.
- [NREL] National Renewable Energy Laboratory. 2025. Image Gallery. [accessed March 6 2025]. <https://images.nrel.gov/mx/Profiles/en/landing/>.
- [NYSERDA] New York State Energy Research and Development Authority. 2019. *2018 Ports Assessment: Offshore Wind Operations and Maintenance Port Facilities*. Final Report No. 19-05. January 2019.
- Oceantic Network 2024. *Port Power: Fueling U.S. Offshore Wind and Local Economies*. 11 July 2024. [accessed December 2024]. <https://oceantic.org/port-power-fueling-u-s-offshore-wind-and-local-economies/>.
- O'Connor B. 2024. *Vineyard Wind*. [accessed December 2024]. <https://www.boboconnor.net/vineyard-wind>.
- Offshorewind.biz. 2024. *Construction to Soon Begin on Biggest US Offshore Wind Farm*. [accessed December 2024]. <https://www.offshorewind.biz/2024/04/15/construction-to-soon-begin-on-biggest-us-offshore-wind-farm/>.
- Recharge News. 2024. *Siemens cuts logistics costs with turbine transport vessel*. [accessed December 2024]. <https://www.rechargenews.com/wind/siemens-cuts-logistics-costs-with-turbine-transport-vessel/1-1-1196735>.
- Schottel. 2024. Your Propulsion Experts. [accessed 20 December 2024]. <https://www.schottel.de/home>.
- Sinoko Cranes 2024. *Port Gantry Crane*. [accessed December 2024]. <https://www.sinokocrane.com/p-1502/High-Reliable-Control-Port-Gantry-Crane.html>.

- Southcoast Wind. 2024. Powering New England's Energy Future. [accessed 20 December 2024]. <https://southcoastwind.com/>.
- U.S. Coast Guard 2018. *United States Coast Guard Maritime Commerce Strategic Outlook*. October 2018. [accessed December 2024]. <https://media.defense.gov/2018/Oct/05/2002049100/-1/-1/1/USCG%20Maritime%20Commerce%20Strategic%20Outlook-Releasable.pdf>
- U.S. Department of the Interior. 2024 Dec 20. *Biden-Harris Administration Approves Eleventh Offshore Wind Project in U.S. History*. [accessed March 2025]. <https://www.doi.gov/pressreleases/biden-harris-administration-approves-eleventh-offshore-wind-project-us-history>.
- [USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 April 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.
- Wang X, Xiangwu Z, Jiale L, Xu Y, Haijun W. 2018. A Review on Recent Advancements of Substructures for Offshore Wind Turbines. *Energy Conversion and Management* 158. [accessed December 2024]. <https://www.sciencedirect.com/science/article/abs/pii/S019689041731213X?via%3Dihub>.

8.4 Port Identification

- National Geospatial-Intelligence Agency. 2019. *World Port Index – Pub. 150*. 27th Edition. [accessed May 2024]. <https://msi.nga.mil/api/publications/download?key=16694622/SFH00000/Pub150bk.pdf&type=view>.
- SeaRates. 2023. United States Sea Ports. [accessed July 2024]. https://www.searates.com/maritime/united_states.
- S&P Global. 2024. *Ports and Terminals Guide 2023-2024*. S&P Global Maritime Portal. [accessed 30 April 2024].

8.5 Overview of Port Modifications, Impacts, and Expected Mitigation

- Brancaccio G, Kalouptsidi M, Papageorgiou T. 2024. Investment in Infrastructure and Trade: The Case of Ports. NBER Working Paper Series. [accessed 15 December 2024]. https://www.nber.org/system/files/working_papers/w32503/w32503.pdf.
- [EPA] U.S. Environmental Protection Agency. 2012. Final Determination for the South Terminal Project. [accessed December 2024]. <https://www.epa.gov/region1/superfund/sites/newbedford/525556.pdf>.
- Navigant Consulting, Inc. 2013. U.S. Offshore Wind Manufacturing and Supply Chain Development. Prepared for the Department of Energy. [accessed December 2024]. http://energy.gov/sites/prod/files/2013/12/f5/us_offshore_wind_supply_chain_and_manufacturing_development.pdf.
- Royal Haskoning. 2003. Bathside Bay Container Port: Planning Applications. Environmental Statement. Prepared for Hutchison Ports (UK) Ltd. April 2003. [accessed December 2024]. <http://www.hict.co.uk/data/downloads/nts-01-06.pdf>.

- Royal Haskoning. 2007. Environmental Impact Assessment for Construction of Maasvlakte 2 Summary. Prepared for Port of Rotterdam Authority, April 2007. [accessed December 2024]. https://www.maasvlakte2.com/uploads/summary_eia_construction_maasvlakte_2.pdf.
- South Coast Today. 2013. Officials Break Ground on New Bedford Marine Commerce Terminal. [accessed December 2024]. <http://www.southcoasttoday.com/article/20130507/NEWS/305070320>.
- [USACE] U.S. Army Corps of Engineers. 2015. Jacksonville District. Port Everglades Harbor Navigation Study. Broward County, Florida. Final Environmental Impact Statement.
- [USACE] U.S. Army Corps of Engineers. 2024a. *Draft Environmental Impact Statement for the Proposed Corpus Christi Ship Channel Deepening Project*. [accessed 16 December 2024]. <https://www.swg.usace.army.mil/Portals/26/docs/regulatory/Special%20Projects/Draft%20EIS%20for%20the%20Proposed%20Corpus%20Christi%20Ship%20Channel%20Deepening%20Vol%20I%20-%20June%202022.pdf?ver=lronJjDL17I2XLdNbnw%3d%3d>.
- [USACE] U.S. Army Corps of Engineers. 2024b. Tampa Harbor Navigation Improvement Study Final Integrated General Reevaluation Report with Environmental Impact Statement. [accessed 15 December 2024]. <https://usace.contentdm.oclc.org/utis/getfile/collection/p16021coll7/id/26324>.

8.6 Environmental and Socioeconomic Port Profiles

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 April 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023a. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- [BOEM] Bureau of Ocean Energy Management. 2023b. *Empire Offshore Wind Final Environmental Impact Statement Volume 1*. OCS EIS/EA BOEM 2023-049. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 17 September 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Empire_Wind_FEIS_Vol1_0.pdf.
- [CEEP] Connecticut Department of Energy and Environmental Protection. 2023a. Critical Habitats. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/2126a00683e347bcb2ee28a75b24326b_0/explore.
- [CEEP] Connecticut Department of Energy and Environmental Protection. 2023b. Natural Diversity Database. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/58c6d263e85647caaa82c466d5794227_0/explore?location=41.494229%2C-72.756599%2C8.08.
- [CEEP] Connecticut Department of Energy and Environmental Protection. 2023c. Shellfish. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/fe5636b6c0d14d678ce17c721b868a51_0/explore.

- [CEEP] Connecticut Department of Energy and Environmental Protection. 2024. Migratory Waterfowl. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/c7b16aa915e94979b1fb65b4bc9f4e0a_0/explore?location=41.468343%2C-72.736568%2C8.62.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Connecticut Department of Economic and Community Development. 2024. Connecticut Cultural Resources Inventory System (ConnCRIS) [database]. [accessed May 2024]. <https://portal.ct.gov/decd/services/historic-preservation>.
- [EPA] U.S. Environmental Protection Agency. 2024a. NAAQS Table. [accessed October 2024]. <https://www.epa.gov/criteria-air-pollutants/naaqs-table>.
- [EPA] U.S. Environmental Protection Agency. 2024b. Nonattainment areas for criteria pollutants (greenbook). [accessed October 2024]. <https://www.epa.gov/green-book>.
- [EPA] U.S. Environmental Protection Agency. 2024c. De Minimis Tables. [accessed October 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 April 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. Street View. [accessed May 2024].
- Maine Historic Preservation Commission. 2024. Cultural Architectural Resource Management Archive [CARMA] [database]. [accessed May 2024]. <https://www.maine.gov/mhpc/quick-links/carma>.
- Maryland Historical Trust. 2024. Medusa Cultural Resources Information System. [accessed May 2024]. <https://apps.mht.maryland.gov/Medusa/MedusaMap.html>.
- Massachusetts Historical Commission. 2024. Massachusetts Cultural Resource Information System [MACRIS] [online database]. [accessed May 2024]. <https://mhc-macris.net/>.
- Massachusetts Department of Conservation and Recreation. 2009. MassGIS Data: Areas of Critical Environmental Concern. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-areas-of-critical-environmental-concern?_gl=1*1qlumao*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxNDM3Mi4wLjAuMA.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018a. Piping Plover and Least Tern Essential Habitat. [accessed 1 May 2024]. https://maine.hub.arcgis.com/datasets/584f6b86265042fd89edb2999834fd76_0/about.

- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018b. Roseate Tern Essential Habitat Layer. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/178b9154e0dc4294a8503ff65cd8606a/explore?location=43.880987%2C-69.088417%2C8.00>.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018c. Seabird Nesting Islands. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/18042bb789b14f428a07a27ccd566319/explore?location=43.867664%2C-68.888028%2C7.74>.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018d. Shorebird Areas. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/a259dcf5a25249bf833a2e6a2ef457cd/explore?location=43.990260%2C-68.843980%2C7.74>.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018e. Special Concern Wildlife Habitat. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/14f07d843abb427a909380ba1db05e81/explore?location=45.016299%2C-69.000962%2C7.00>.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018f. Tidal Waterfowl and Wading Bird Habitat. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/376e82589e1e472b9d9993ed09d20622/explore?location=44.032917%2C-68.918541%2C7.68>.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018g. Endangered and Threatened Fish. Accessed May 1, 2024. Available at: https://maine.hub.arcgis.com/datasets/9e0ea12a62ce4722bc40f0428546a931_0/about.
- [MDIFW] Maine Department of Inland Fisheries and Wildlife. 2022. Maine Heritage Fish Waters. [accessed 1 May 2024]. https://maine.hub.arcgis.com/maps/ec4907f66015462983450621997c6554_0/about.
- [MDMF] Massachusetts Division of Marine Fisheries. 2011. MassGIS Data: Shellfish Suitability Areas. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-shellfish-suitability-areas?_gl=1*1wafacf*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxNDA1MC4wLjAuMA.
- [MDMF] Massachusetts Division of Marine Fisheries. 2023a. MassGIS Data: Diadromous Fish. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-diadromous-fish?_gl=1*50ibdd*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxMzU2MS4wLjAuMA.
- [MDMF] Massachusetts Division of Marine Fisheries. 2023b. MassGIS Data: Eelgrass Phase 6: 2019-2023. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-massdep-eelgrass-phase-6-2019-2023?_gl=1*nuh16f*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxMzk4NS4wLjAuMA.
- [MDMR] Maine Department of Marine Resources. 2018a. MaineDMR Aquaculture - AQ Leases. Accessed May 1, 2024. Available at: <https://maine.hub.arcgis.com/maps/maine::mainedmr-aquaculture-aq-leases/about>.

- [MDMR] Maine Department of Marine Resources. 2018b. MaineDMR Scallop Management - Scallop Zones. Accessed May 1, 2024. Available at: https://maine.hub.arcgis.com/maps/ee846b5125454305b117930625811f85_4/about.
- [MDMR] Maine Department of Marine Resources. 2018c. MaineDMR - Eelgrass. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/maps/maine::mainedmr-eelgrass/about>.
- [MDMR] Maine Department of Marine Resources. 2019. MaineDMR Molluscan Shellfish 2010. [accessed 1 May 2024].
- [MDNR] Maryland Department of Natural Resources. 2017a. Maryland Finfish - White Perch Juvenile Habitat. [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-white-perch-juvenile-habitat/about>.
- [MDNR] Maryland Department of Natural Resources. 2017b. Maryland Finfish - Yellow Perch Spawning Habitat. [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-yellow-perch-spawning-habitat/about>.
- [MDNR] Maryland Department of Natural Resources. 2017c. Maryland Finfish - Herring Juvenile Habitat. [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-herring-juvenile-habitat/about>.
- [MDNR] Maryland Department of Natural Resources. 2017d. Maryland Finfish - Tidal (Adult Habitat). [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-tidal-adult-habitat/about>.
- [MDNR] Maryland Department of Natural Resources. 2017e. Maryland Living Resources - Sensitive Species Project Review Areas. [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-living-resources-sensitive-species-project-review-areas/about>.
- [MDNR] Maryland Department of Natural Resources. 2017f. Maryland Living Resources - Natural Heritage Areas. [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-living-resources-natural-heritage-areas/about>.
- [MDNR] Maryland Department of Natural Resources. 2017g. Maryland Shellfish - Oyster Harvest Reserves. [accessed May 2024]. https://data.imap.maryland.gov/datasets/707df439c0af42fab213e3633f42f722_0/explore?location=39.204753%2C-76.494046%2C13.96.
- [MDNR] Maryland Department of Natural Resources. 2017h. Maryland Shellfish - Public Shellfishery Areas. [accessed May 2024]. https://data.imap.maryland.gov/datasets/241ab949191f4ef88e40663d21dbb612_3/explore?location=39.160138%2C-76.384880%2C11.94.
- [MDNR] Maryland Department of Natural Resources. 2017i. Maryland Wetlands - Wetlands, Polygon (Special State Concern). [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-wetlands-wetlands-polygon-special-state-concern/about>.
- [MDNR] Maryland Department of Natural Resources. 2019. Maryland Shellfish - Oyster Sanctuaries. [accessed May 2024]. https://data.imap.maryland.gov/datasets/746edac445f345c5abb1ca307c5ddd4f_4/explore?location=39.100880%2C-76.325271%2C10.61.

- [MDNR] Maryland Department of Natural Resources. 2023. Maryland Submerged Aquatic Vegetation 2021. [accessed May 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-submerged-aquatic-vegetation-2021/about>.
- [MNHESP] Massachusetts Natural Heritage & Endangered Species Program. 2021a. MassGIS Data: NHESP Estimated Habitats of Rare Wildlife. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-nhesp-estimated-habitats-of-rare-wildlife?_gl=1*1wwdy1*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxNDQ5OC4wLjAuMA.
- [MNHESP] Massachusetts Natural Heritage & Endangered Species Program. 2021b. MassGIS Data: NHESP Priority Habitats of Rare Species. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-nhesp-priority-habitats-of-rare-species?_gl=1*y197v4*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxNDY3Ny4wLjAuMA.
- [MNHESP] Massachusetts Natural Heritage & Endangered Species Program. 2023. MassGIS Data: NHESP Natural Communities. [accessed 6 May 2024]. https://www.mass.gov/info-details/massgis-data-nhesp-natural-communities?_gl=1*vh4k35*_ga*MzA3OTA2MDM0LjE3MDU5NTY2NTA.*_ga_MCLPEGW7WM*MTcxNTAxMzU2MS4xLjEuMTcxNTAxNDYwNS4wLjAuMA.
- Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness (NLCD). [accessed 6 May 2024]. <https://www.mrlc.gov/data>.
- National Audubon Society. 2024. Important Bird Areas. [accessed 6 May 2024]. <https://www.audubon.org/important-bird-areas>.
- National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [accessed May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.
- [NCDMF] North Carolina Division of Marine Fisheries. 2022. Submerged Aquatic Vegetation (SAV) 2019-2020 Mapping. [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/ncdenr::submerged-aquatic-vegetation-sav-2019-2020-mapping/about>
- [NCDMF] North Carolina Division of Marine Fisheries. 2023. Estuarine Benthic Habitat Mapping Areas (Iteration 2). [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/nconemap::estuarine-benthic-habitat-mapping-areas-iteration-2/about>.
- [NCNHP] North Carolina Natural Heritage Program. 2023. Biodiversity and Wildlife Habitat Assessment. [accessed 10 May 2024.] <https://www.nconemap.gov/maps/1c489a78c56c4d84bffe558cc570e6/about>.
- [NCNHP] North Carolina Natural Heritage Program. 2024. NHP Natural Areas. [accessed 10 May 2024]. <https://www.nconemap.gov/maps/NC::north-carolina-natural-heritage-program-natural-areas/about>
- New Jersey Historic Preservation Office. 2024. Identification of Historic Resources. <https://www.nj.gov/dep/hpo/1identify/identify.htm>
- New York State Office of Parks, Recreation and Historical Preservation. NYSCRIS. [accessed May 2024]. <https://cris.parks.ny.gov/Login.aspx?ReturnUrl=%2f>.

- [NJDEP] New Jersey Department of Environmental Protection. 2017. Conservation Focal Areas Version 1.1, Delaware Bay Landscape Region in New Jersey. [accessed 8 May 2024]. <https://gisdata-njdep.opendata.arcgis.com/maps/fc6b73fd8670436a9d672981aa5006bc/about>.
- [NJDEP] New Jersey Department of Environmental Protection. 2018. Terrestrial Wildlife Habitat Cores and Corridors in New Jersey, Connecting Habitat Across New Jersey (CHANJ). [accessed 8 May 2024]. <https://gisdata-njdep.opendata.arcgis.com/maps/bee8b65301514b67a3750afbad9dfeca/about>.
- [NJDEP] New Jersey Department of Environmental Protection. 2023. Natural Heritage Priority Sites in New Jersey. [accessed 8 May 2024]. <https://gisdata-njdep.opendata.arcgis.com/maps/0aaefb4a68ba4fac824b31d4c59578fe/about>.
- [NJDEP] New Jersey Department of Environmental Protection. 2024. NJDEP Land Resource Protection (LRP) Bureau of Tidelands Polygon Activity Features in New Jersey. [accessed 8 May 2024]. https://gisdata-njdep.opendata.arcgis.com/datasets/2476f16e5b1c428ba9a3b4b2eecb23e2_127/explore?location=39.553768%2C-75.514597%2C10.00
- [NJGIN] New Jersey Geographic Information Network. 2024. New Jersey Geographic Information Network. <https://njgin.nj.gov/>.
- [NOAA] National Oceanic and Atmospheric Administration. 2020a. Fisheries' Fisheries One Stop Shop (FOSS) landing data and Community Social Vulnerabilities Indicators Tool. [accessed May 2024]. <https://www.fisheries.noaa.gov/foss/f?p=215:26:17149093442213>.
- [NOAA] National Oceanic and Atmospheric Administration. 2020b. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 April 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.
- [NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.
- [NOAA] National Oceanic and Atmospheric Administration. 2022. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.
- [NOAA] National Oceanic and Atmospheric Administration. 2023a. EIS GIS Data and PDF Maps: Environmental Sensitivity Index including GIS Data and Maps (for the U.S. Shorelines, including Alaska, Hawaii, and Puerto Rico). NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 14 May 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2023b. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

- [NOAA] National Oceanic and Atmospheric Administration. 2023c. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.
- [NOAA] National Oceanic and Atmospheric Administration. 2023d. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.
- [NOAA] National Oceanic and Atmospheric Administration. 2024. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 April 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.
- North Carolina Historic Preservation Office. 2024. Historic Preservation Office Web 2.0 database. <https://nc.maps.arcgis.com/home/item.html?id=d2d04d8d7e03403f889419526e682529https://nc.maps.arcgis.com/apps/webappviewer/index.html?id=d2d04d8d7e03403f889419526e682529>.
- [NREL] National Renewable Energy Laboratory. 2023. A Supply Chain Road Map for Offshore Wind Energy in the United States. [accessed March 2025]. <https://www.nrel.gov/docs/fy23osti/84710.pdf>.
- [NYDEC] New York Department of Environmental Conservation. 2021. Significant Coastal Fish & Wildlife Habitats-NY. [accessed May 2024]. https://data.gis.ny.gov/datasets/bfd454f77f7be4598bb04adea2563acd9_0/explore.
- [NYDEC] New York Department of Environmental Conservation. 2022a. Hudson Valley Forest Condition Index. [accessed May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about.
- [NYDEC] New York Department of Environmental Conservation. 2022b. Hudson Valley Significant Biodiversity Areas. [accessed May 2024].
- [NYDEC] New York Department of Environmental Conservation. 2023. State Regulated Freshwater Wetlands. [accessed May 2024]. <https://data.gis.ny.gov/maps/a57e144caedb4b1aaf510809013e4ac7/about>.
- [NYDEC] New York Department of Environmental Conservation. 2024. Natural Heritage Important Areas NYNHP. [accessed May 2024].
- Rhode Island Historical Preservation and Heritage Commission. 2024. State of Rhode Island Historic Property Search [database]. <https://preservation.ri.gov/historic-places>.
- [RIDEM] Rhode Island Department of Environmental Management. 2023a. Bird Species [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.
- [RIDEM] Rhode Island Department of Environmental Management. 2023b. Shellfish Harvest Restrictions [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

- [RIDEM] Rhode Island Department of Environmental Management. 2024. Natural Heritage Areas (2023) [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.
- Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.
- Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. Northern Pass Transmission Line Visual Impact Assessment. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptlc_psnh_app_17_visual_impact_assessment.pdf.
- [TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston, Massachusetts: Eastern Resource Office of The Nature Conservancy. [accessed 6 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.
- [TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 6 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.
- University of Rhode Island Environmental Data Center. 2024. Submerged Aquatic Vegetation (SAV) in RI Coastal Waters (2021) [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.
- [USCB] U.S. Census Bureau. 2023. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed April 2024]. Available from: <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US3930>
- [USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 April 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.
- [USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 April 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.
- [USFWS] U.S. Fish and Wildlife Service. 2023a. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 6 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.
- [USFWS] U.S. Fish and Wildlife Service. 2023b. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 6 May 2024]. <https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.
- [USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 April 2024]. <https://ipac.ecosphere.fws.gov/>.

- U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. 2010. *Federal Land Managers' Air Quality Related Values Work Group (FLAG): Phase I Report—Revised (2010)*. Natural Resource Report NPS/NRPC/NRR—2010/232. [accessed March 2025]. <https://www.fws.gov/guidance/sites/guidance/files/documents/FLAG%20Air%20Quality%20Phase%201%20report.pdf>.
- [USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 6 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.
- [USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 6 May 2024]. <https://doi.org/10.5066/P96WBCHS>.
- Virginia Department of Environmental Management. 2020. Coastal Avian Protection Zone (CAPZ). [accessed 8 May 2024]. https://vgin.vdem.virginia.gov/datasets/680e51caba6348f1af812a795ac35a90_163/explore?location=36.782140%2C-76.196925%2C11.29.
- Virginia Department of Historic Resources. 2024. Virginia Cultural Resource Information System (VCRIS) [database]. <https://www.dhr.virginia.gov/programs/vcris/>.
- Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

8.7 Conclusions

- U.S. Coast Guard 2018. *United States Coast Guard Maritime Commerce Strategic Outlook*. October 2018. [accessed 10 December 2024]. <https://media.defense.gov/2018/Oct/05/2002049100/-1/-1/1/USCG%20Maritime%20Commerce%20Strategic%20Outlook-Releasable.pdf>.

Appendix A: Port Characterization

Appendix A provides threshold values for each screening criteria by capability area and characterizes the existing conditions at each priority port.

- Table A-1 identifies the threshold values for each screening criteria by capability area.
- Table A-2 characterizes each of the priority ports with respect to its geographic location and its suitability of primary activities.
- Table A-3 characterizes each priority port with respect to access and quayside capability.
- Table A-4 characterizes each priority port with respect to upland storage, roll-on/roll-off (Ro/Ro) capability, cranes and transportation.

Table A-1. Criteria specific threshold values

Capability Area	Criteria	Unit	Threshold Value (15 MW)	Threshold Value (18 MW)	Threshold Value (21 MW)
Access	Channel Width	Feet	360	360	360
Access	Channel Controlling Depth	Feet	40	40	40
Access	Air Draft	Feet	410	410	410
Access	Number of Berths	Count	2	2	2
Quayside Capability	Quayside Bearing Capacity	Metric tons per square meter	15–30	15–30	15–30
Quayside Capability	Quayside Length	Feet	600–2,000	600–2,000	600–2,000
Quayside Capability	Quayside Berth Controlling Depth	Feet	40	40	40
Quayside Capability	Spud-Jacking Suitability	Yes or No	Y	Y	Y
Upland Storage	Size	Acres	22–24	27–32	27–32
Upland Storage	Ground Bearing Capacity	Metric tons per square meter	10	10	10
Upland Storage	Haul Route Ground Bearing Capacity	Metric tons per square meter	10	10	10
Ro/Ro Capability	Capability	Yes or No	Y	Y	Y
Ro/Ro Capability	Width of Ro/Ro Berth	Feet	16–130	16–130	16–130
Ro/Ro Capability	Ro/Ro Berth and Ramp Bearing Capacity	Metric tons per square meter	10	10	10
Cranes	Existing Crane Lifting Capacities	Metric tons	700	1000	1500
Cranes	Existing Crane Height Restrictions	Feet	400	400	400
Transportation	On-Site Rail Access	Yes or No	Y	Y	Y

Table A-2. Priority Ports: Regional location and potential suitability for primary activities

Port/Terminal	State	Region	Port Profile (Yes or No)	Manufacturing and Fabrication	Staging and Installation	Operations and Maintenance
Bangor	ME	Northern New England	No	–	–	X
Bath	ME	Northern New England	No	–	–	X
Boston	MA	Northern New England	No	–	X	X
Gloucester	MA	Northern New England	No	–	–	X
Portland	ME	Northern New England	Yes	–	–	X
Portsmouth	NH	Northern New England	No	–	–	X
Quincy	MA	Northern New England	No	–	–	X

Port/Terminal	State	Region	Port Profile (Yes or No)	Manufacturing and Fabrication	Staging and Installation	Operations and Maintenance
Salem	MA	Northern New England	Yes	–	X	X
Searsport (Sears Island)	ME	Northern New England	Yes	X	X	X
Bridgeport	CT	Southern New England and New York Bight	Yes	–	X	X
Kingston	RI	Southern New England and New York Bight	No	–	–	X
New Bedford	MA	Southern New England and New York Bight	No	–	X	X
New Haven	CT	Southern New England and New York Bight	Yes	–	X	X
New London	CT	Southern New England and New York Bight	No	–	X	X
Newport	RI	Southern New England and New York Bight	No	–	–	X
Providence (South Quay)	RI	Southern New England and New York Bight	Yes	–	X	X
Quonset / Davisville	RI	Southern New England and New York Bight	Yes	–	–	X
Somerset (Brayton Point)	MA	Southern New England and New York Bight	No	–	–	X
Tiverton	RI	Southern New England and New York Bight	No	–	–	X
Warwick	RI	Southern New England and New York Bight	No	–	–	–
Albany	NY	Southern New England and New York Bight	Yes	X	X	–
Bayonne	NJ	Southern New England and New York Bight	No	–	–	X
Brooklyn (South Brooklyn Marine Terminal)	NY	Southern New England and New York Bight	Yes	X	X	X
Arthur Kill Terminal	NY	Southern New England and New York Bight	Yes	–	X	X
Carteret	NJ	Southern New England and New York Bight	No	–	–	X
Chrome	NJ	Southern New England and New York Bight	No	–	–	X
Elizabethport	NJ	Southern New England and New York Bight	No	–	X	X
Grasselli	NJ	Southern New England and New York Bight	No	–	–	X
Gulfport SI	NY	Southern New England and New York Bight	No	–	–	X
Hoboken	NJ	Southern New England and New York Bight	No	–	–	X
Jersey City	NJ	Southern New England and New York Bight	No	–	–	X
Leonardo	NJ	Southern New England and New York Bight	No	–	–	X
Mariners Harbor SI	NY	Southern New England and New York Bight	No	–	–	X
Newark	NJ	Southern New England and New York Bight	No	–	X	X
New York City	NY	Southern New England and New York Bight	No	–	X	X
Perth Amboy	NJ	Southern New England and New York Bight	No	–	X	X
Port Reading	NJ	Southern New England and New York Bight	No	–	–	X
Port Richmond SI	NY	Southern New England and New York Bight	No	–	–	X
Port Socony	NJ	Southern New England and New York Bight	No	–	–	X

Port/Terminal	State	Region	Port Profile (Yes or No)	Manufacturing and Fabrication	Staging and Installation	Operations and Maintenance
South Amboy	NJ	Southern New England and New York Bight	No	–	–	X
Stapleton SI	NY	Southern New England and New York Bight	No	–	–	X
Tompkinsville SI	NY	Southern New England and New York Bight	No	–	–	X
Weehawken	NJ	Southern New England and New York Bight	No	–	–	X
Yonkers	NY	Southern New England and New York Bight	No	–	–	X
Chester	PA	Mid-Atlantic	No	–	–	X
Gloucester	NJ	Mid-Atlantic	No	–	–	X
Marcus Hook	PA	Mid-Atlantic	No	–	X	X
Paulsboro	PA	Mid-Atlantic	No	X	X	X
NJ Wind Port (Lower Alloways Creek)	NJ	Mid-Atlantic	Yes	X	X	X
Philadelphia	PA	Mid-Atlantic	No	X	–	–
Wilmington	DE	Mid-Atlantic	No	–	–	X
Baltimore (Tradepoint Atlantic)	MD	Mid-Atlantic	Yes	X	X	X
Hampton Roads (Newport News)"	VA	Mid-Atlantic	No	–	–	X
Hampton Roads (Norfolk, Fairwinds Landing)	VA	Mid-Atlantic	Yes	–	–	X
Hampton Roads (Portsmouth Marine Terminal)	VA	Mid-Atlantic	Yes	X	X	X
Washington DC	DC	Mid-Atlantic	No	–	–	–
Alexandria	VA	Mid-Atlantic	No	–	–	–
Brunswick	GA	South Atlantic	No	–	X	X
Charleston	SC	South Atlantic	No	–	X	X
Fernandina Beach	FL	South Atlantic	No	–	–	X
Jacksonville	FL	South Atlantic	No	–	–	X
Miami	FL	South Atlantic	No	–	–	X
Morehead City (Radio Island)	NC	South Atlantic	Yes	X	X	X
Port Everglades	FL	South Atlantic	No	–	X	X
Savannah	GA	South Atlantic	No	–	X	X
Wilmington	NC	South Atlantic	Yes	–	X	X
Wrightsville	NC	South Atlantic	No	–	–	–

Table A-3. Priority Ports: Access and quayside capability

Port/Terminal (units)	State	Port Profile (yes/no)	Channel Width (feet)	Channel Controlling Depth (feet)	Air Draft (feet)	Number of Berths	Quayside Bearing Capacity (mt/m ²)	Quayside Length (feet)	Quayside Berth Controlling Depth (feet)	Spud-Jacking Suitability (yes/no)
Bangor	ME	No	n/a	13.5	143	2	–	–	20	–
Bath	ME	No	540	24	Unlimited	1	–	–	30	–
Boston	MA	No	300	40	340	3 Flynn Terminal 4 Conoly Terminal	9.8	1,725	50	–
Gloucester	MA	No	300	16	Unlimited	1	–	500	30	–
Portland	ME	Yes	1000	35	Unlimited	3	2.4 MSP 4.9 IMT	1000 MSP 785 IMT	35 (MSP) 32 (IMT)	–
Portsmouth	NH	No	300	30	Unlimited	2	–	915	35	–
Quincy	MA	No	135	28	175	3	–	–	30	–
Salem	MA	Yes	300	32.0	Unlimited	1	n/a	6,100	32	N
Searsport (Sears Island)	ME	Yes	n/a	49	Unlimited	2	n/a	9,000	49	–
Bridgeport	CT	Yes	400	35	Unlimited	2	1.2	>800	28	N
Kingston	RI	No	250	10	215	2	–	–	–	–
New Bedford	MA	No	150	28	Unlimited	3	20 Uniform 100 Concentrated	1,170	30	–
New Haven	CT	Yes	400	35	Unlimited	12	9.8	1,575	35	Y
New London	CT	No	500	30	Unlimited	2	24.4	1,050	36	–
Newport	RI	No	1,000	16	Unlimited	1	–	–	45	–
Providence (South Quay)	RI	Yes	600	40	197	6	19.5	4200	40	Y
Quonset/Davisville	RI	Yes	500	30	215	4	Pier 1: 4.88 Pier 2: 9.76	4,500	32	–
Somerset (Brayton Point)	MA	No	175	35	135	2	9.8	690	35	–
Tiverton	RI	No	125	26	135	0	–	–	25	–
Warwick	RI	No	150	6	135	2	–	–	–	–
Albany	NY	Yes	600	32	134	7	4.8–9.8	5,900	32	N
Bayonne	NJ	No	500	20	215	7	–	2,700	47	–

Port/Terminal (units)	State	Port Profile (yes/no)	Channel Width (feet)	Channel Controlling Depth (feet)	Air Draft (feet)	Number of Berths	Quayside Bearing Capacity (mt/m ²)	Quayside Length (feet)	Quayside Berth Controlling Depth (feet)	Spud-Jacking Suitability (yes/no)
Brooklyn (South Brooklyn Marine Terminal)	NY	Yes	1,200	40	228	2	29.3	1,950	36	Y
Arthur Kill Terminal	NY	Yes	600	36	Unlimited	None	n/a	1,420	1–4	Y
Carteret	NJ	No	500	35	143	2	–	–	–	–
Chrome	NJ	No	500	35	143	0	–	–	–	–
Elizabethport	NJ	No	500	50	215	1	–	–	40	–
Grasselli	NJ	No	500	35	140	2	–	–	–	–
Gulfport SI	NY	No	500	40	143	0	–	–	40	–
Hoboken	NJ	No	550	45	215	1	–	–	–	–
Jersey City	NJ	No	550	45	215	1	–	–	–	–
Leonardo	NJ	No	n/a	30	Unlimited	0	–	–	–	–
Mariners Harbor SI	NY	No	400	45	215	1	–	–	–	–
Newark	NJ	No	985	40	215	5	9.76	4,800	35–50	–
New York City	NY	No	985	42	215	1	–	–	45	–
Perth Amboy	NJ	No	600	35	Unlimited	2	–	–	30	–
Port Reading	NJ	No	600	35	Unlimited	2	–	–	–	–
Port Richmond SI	NY	No	800	50	215	0	–	–	32	–
Port Socony	NJ	No	600	35	143	2	–	–	–	–
South Amboy	NJ	No	300	24	215	1	–	–	–	–
Stapleton SI	NY	No	n/a	42	215	2	–	500	45	–
Tompkinsville SI	NY	No	n/a	42	215	0	–	–	–	–
Weehawken	NJ	No	1,800	45	215	1	–	–	–	–
Yonkers	NY	No	1,800	30	215	2	–	–	–	–
Chester	PA	No	870	40	190	1+	–	–	40	–
Gloucester	NJ	No	n/a	40	190	4	–	630	45	–
Marcus Hook	PA	No	840	40	190	4	–	–	–	–
Paulsboro	PA	No	840	40	190	3	–	850	40	–
New Jersey Wind Port (Lower Alloways Creek)	NJ	Yes	840	40	Unlimited	None	n/a	n/a	n/a	Y

Port/Terminal (units)	State	Port Profile (yes/no)	Channel Width (feet)	Channel Controlling Depth (feet)	Air Draft (feet)	Number of Berths	Quayside Bearing Capacity (mt/m ²)	Quayside Length (feet)	Quayside Berth Controlling Depth (feet)	Spud-Jacking Suitability (yes/no)
Philadelphia	PA	No	400	40	190	5	–	5,820	40	–
Wilmington	DE	No	320	26	175	10	–	–	38	–
Baltimore (Tradepoint Atlantic)	MD	Yes	700	50	Unlimited	3	14.6	3,350 (combined)	38–43	–
Hampton Roads (Newport News)	VA	No	800	50	Unlimited	2	–	1,500	41	–
Hampton Roads (Norfolk, Fairwinds Landing)	VA	Yes	750	40	Unlimited	6	–	>6,000	32–40	–
Hampton Roads (Portsmouth Marine Terminal)	VA	Yes	750	40	Unlimited	3	~1,000–3,000	3,540	38	Y
Washington DC	DC	No	200	6	Unlimited	0	–	–	–	–
Alexandria	VA	No	200	20	Unlimited	0	–	–	20	–
Brunswick	GA	No	400	30	185	3	–	3,350	30	–
Charleston	SC	No	500	41	101	3	–	2,500	45	–
Fernandina Beach	FL	No	500	23	Unlimited	2	–	–	25	–
Jacksonville	FL	No	750	36	Unlimited	17	–	16,876	40	–
Miami	FL	No	400	34	Unlimited	7	–	6,125	50	–
Morehead City (Radio Island)	NC	Yes	400	45	Unlimited	None	–	320	45	–
Port Everglades	FL	No	450	42	Unlimited	15	–	–	76	–
Savannah	GA	No	500	42	Unlimited	5	–	–	42	–
Wilmington	NC	Yes	500	42	212	9	~9.8–19.5	6,470	38–42	–
Wrightsville	NC	No	n/a	6	Unlimited	0	–	–	–	–

Notes: IMT = International Maine Terminal; MSP = Maine State Pier; mt = metric ton; n/a = not applicable; – = data could not be identified.

Table A-4. Priority Ports: Upland storage, Roll-On/Roll-Off capability, cranes, and transportation

Port/Terminal (units)	State	Port Profile (yes/no)	Upland Storage Size (acres)	Upland Storage Site Ground Bearing Capacity (mt/m ²)	Haul Route Ground Bearing Capacity (mt/m ²)	Ro/Ro Capability (yes/no)	Width of Ro/Ro Berth (feet)	Ro/Ro Berth and Ramp Bearing Capacity (mt/m ²)	Existing Crane Lifting Capacities (mt)	Existing Crane Height Restrictions (feet)	On-Site Rail Access (yes/no)
Bangor	ME	No	–	–	–	N	–	–	–	–	Y
Bath	ME	No	–	–	–	N	–	–	100+	–	Y
Boston	MA	No	88	9.76	–	Y	–	–	Flynn Terminal = 50.8–65 Conoly Terminal = 100+	90–163	Y
Gloucester	MA	No	–	–	–	N	–	–	24	–	Y
Portland	ME	Yes	9.75 (IMT)	–	–	Y	48	–	112 (x2)	Unlimited	MSP = N IMT = Y
Portsmouth	NH	No	8	–	–	Y	–	–	–	–	N
Quincy	MA	No	–	–	–	–	–	–	–	–	–
Salem	MA	Yes	42	14.6	14.6	N	n/a	n/a	n/a	Unlimited	N
Searsport (Sears Island)	ME	Yes	300	–	–	N	n/a	n/a	n/a	Unlimited	N
Bridgeport	CT	Yes	9.00	~6.1	–	N	n/a	n/a	n/a	Unlimited	N
Kingston	RI	No	–	–	–	–	–	–	–	–	–
New Bedford	MA	No	29	–	–	–	–	–	750	100	Y
New Haven	CT	Yes	50	–	–	N	n/a	n/a	>50 (x2)	Unlimited	Y
New London	CT	No	–	14.7	–	–	–	–	85	–	Y
Newport	RI	No	–	–	–	–	–	–	100+	–	–
Providence (South Quay)	RI	Yes	20	–	–	N	n/a	n/a	144	Unlimited	Y
Quonset / Davisville	RI	Yes	6	–	–	Y	–	–	150	Unlimited	Y
Somerset (Brayton Point)	MA	No	306	14.6	–	–	–	–	–	–	N
Tiverton	RI	No	–	–	–	–	–	–	–	–	–
Warwick	RI	No	–	–	–	–	–	–	–	–	–
Albany	NY	Yes	20	–	–	Y	60	7.8	225	Unlimited	Y
Bayonne	NJ	No	–	–	–	–	–	–	100+	180	–
Brooklyn (South Brooklyn Marine Terminal)	NY	Yes	73	29.(Waterfront); 15.9 (Additional)	–	N	n/a	n/a	3,200	Unlimited	Y
Arthur Kill Terminal	NY	Yes	33	–	–	N	n/a	n/a	n/a	Unlimited	N

Port/Terminal (units)	State	Port Profile (yes/no)	Upland Storage Size (acres)	Upland Storage Site Ground Bearing Capacity (mt/m ²)	Haul Route Ground Bearing Capacity (mt/m ²)	Ro/Ro Capability (yes/no)	Width of Ro/Ro Berth (feet)	Ro/Ro Berth and Ramp Bearing Capacity (mt/m ²)	Existing Crane Lifting Capacities (mt)	Existing Crane Height Restrictions (feet)	On-Site Rail Access (yes/no)
Carteret	NJ	No	–	–	–	–	–	–	–	–	–
Chrome	NJ	No	–	–	–	–	–	–	–	–	–
Elizabethport	NJ	No	–	–	–	–	–	–	–	–	Y
Grasselli	NJ	No	–	–	–	–	–	–	–	–	–
Gulfport SI	NY	No	–	–	–	–	–	–	–	–	Y
Hoboken	NJ	No	–	–	–	–	–	–	–	–	N
Jersey City	NJ	No	–	–	–	Y	–	–	–	–	–
Leonardo	NJ	No	–	–	–	–	–	–	–	–	–
Mariners Harbor SI	NY	No	–	–	–	–	–	–	–	–	–
Newark	NJ	No	–	–	–	–	–	–	300	–	Y
New York City	NY	No	–	–	–	–	–	–	100+	–	Y
Perth Amboy	NJ	No	–	–	–	–	–	–	–	–	–
Port Reading	NJ	No	–	–	–	–	–	–	–	–	N
Port Richmond SI	NY	No	–	–	–	–	–	–	49	–	Y
Port Socony	NJ	No	–	–	–	–	–	–	–	–	–
South Amboy	NJ	No	–	–	–	–	–	–	–	–	–
Stapleton SI	NY	No	–	–	–	–	–	–	–	–	N
Tompkinsville SI	NY	No	–	–	–	–	–	–	–	–	–
Weehawken	NJ	No	–	–	–	–	–	–	–	–	–
Yonkers	NY	No	–	–	–	–	–	–	–	–	Y
Chester	PA	No	–	–	–	–	–	–	100	–	–
Gloucester	NJ	No	–	–	–	–	–	–	140	–	Y
Marcus Hook	PA	No	–	–	–	–	–	–	–	–	N
Paulsboro	PA	No	–	–	–	–	–	–	–	–	Y
New Jersey Wind Port (Lower Alloways Creek)	NJ	Yes	0	n/a	n/a	N	n/a	n/a	n/a	Unlimited	N
Philadelphia	PA	No	12	–	–	Y	–	–	114	–	Y
Wilmington	DE	No	–	–	–	Y	–	–	100	–	Y
Baltimore (Tradepoint Atlantic)	MD	Yes	50	14.6	14.6	Y	60	14.6	85	Unlimited	Y

Port/Terminal (units)	State	Port Profile (yes/no)	Upland Storage Size (acres)	Upland Storage Site Ground Bearing Capacity (mt/m ²)	Haul Route Ground Bearing Capacity (mt/m ²)	Ro/Ro Capability (yes/no)	Width of Ro/Ro Berth (feet)	Ro/Ro Berth and Ramp Bearing Capacity (mt/m ²)	Existing Crane Lifting Capacities (mt)	Existing Crane Height Restrictions (feet)	On-Site Rail Access (yes/no)
Hampton Roads (Newport News)	VA	No	18	–	–	Y	–	–	–	–	Y
Hampton Roads (Norfolk, Fairwinds Landing)	VA	Yes	>111	–	–	Y	25	–	50	Unlimited	Y
Hampton Roads (Portsmouth Marine Terminal)	VA	Yes	22	~4.9–14.6	~4.9–14.6	Y	300	~4.9–14.6	~500–700	Unlimited	N
Washington DC	DC	No	–	–	–	–	–	–	–	–	Y
Alexandria	VA	No	–	–	–	–	–	–	–	–	Y
Brunswick	GA	No	637	–	–	Y	–	–	100	–	Y
Charleston	SC	No	40	–	–	Y	–	–	453.6	115	Y
Fernandina Beach	FL	No	–	–	–	–	–	–	–	–	Y
Jacksonville	FL	No	–	–	–	–	–	–	100	–	N
Miami	FL	No	–	–	–	Y	–	–	100+	–	Y
Morehead City (Radio Island)	NC	Yes	0	n/a	n/a	N	n/a	n/a	n/a	Unlimited	Y
Port Everglades	FL	No	–	–	–	Y	–	–	100+	–	Y
Savannah	GA	No	99	–	–	Y	–	–	100 and 500	–	Y
Wilmington	NC	Yes	125	~9.8–19.5	~9.8–19.5	Y	Varies	~9.8–19.5	100 and 150	212	Y
Wrightsville	NC	No	–	–	–	–	–	–	–	–	Y

Notes: IMT = International Maine Terminal; MSP = Maine State Pier; mt = metric ton; n/a = not applicable; – = data could not be identified.

A.1 Appendix A References

- ABS. 2021. *Positioning for US Expansion: US Ports and Vessels Innovation*. [accessed December 2024]. <https://absinfo.eagle.org/acton/attachment/16130/f-98f8192f-6ba8-4f7c-b2f6-a30a8c41209d/1/-/-/-/ABS-Offshore-Wind-Report-Positioning-for-US-Expansion-Ports-and-Vessels-Innovation.pdf>.
- [ADPC] Albany Port District Commission. 2019. *2018 Annual Report*. [accessed May 2024]. https://www.portofalbany.us/wp-content/uploads/2019/06/POA_2018_Annual_Report.pdf.
- APM Terminals. 2024. Our Terminal. [accessed December 2024]. <https://www.apmterminals.com/en/port-elizabeth/about/our-terminal>.
- Booker C. 2023. Booker Announces \$52.5 million to New Jersey Ports to Improve Operations, Enhance Sustainability. U.S. Senator Cory Booker of New Jersey [website]. [accessed 5 December 2023]. <https://www.booker.senate.gov/news/press/booker-announces-525-million-to-new-jersey-ports-to-improve-operations-enhance-sustainability>.
- Bunker Ports News Worldwide. 2024. Bunker Ports News Worldwide. Stapleton, USA. [accessed December 2024]. <http://www.bunkerportsnews.com/PortDetails.aspx?ElementID=36b04c77-dbe8-4fb7-883f-c9d29017c6fc>.
- BVG Associates. 2018. *The Virginia advantage: The roadmap for the offshore wind supply chain in Virginia*. [accessed September 2024]. [https://energy.virginia.gov/offshore-wind/documents/BVGA-20802-Report-r2-final-20191127%20\(1\).pdf](https://energy.virginia.gov/offshore-wind/documents/BVGA-20802-Report-r2-final-20191127%20(1).pdf).
- BVG Associates. 2021. *Building North Carolina's Offshore Wind Supply Chain*. [accessed August 2024]. <https://www.commerce.nc.gov/report-building-north-carolinas-offshore-wind-supply-chain/download>.
- City of Bangor Parks and Recreation Department. 2024. Harbor. [accessed December 2024]. <https://www.bangormaine.gov/352/Harbor>.
- City of Bath Maine. 2024. Kennebec River. [accessed December 2024]. <https://www.cityofbathmaine.gov/kennebec-river>.
- City of New Haven. 2024. Port of New Haven. [accessed June 2024]. <https://www.newhavenct.gov/government/departments-divisions/port-authority/port-of-new-haven>.
- City of Portland. 2024a. Maine State Pier. [accessed 30 May 2024]. <https://www.portlandmaine.gov/1170/Maine-State-Pier>.
- City of Portland. 2024b. Three Berths. [accessed 30 May 2024]. <https://www.portlandmaine.gov/969/Three-Berths>.
- City of Warwick. 2023. *Harbor Management Plan*. [accessed December 2024]. https://www.warwickri.gov/sites/g/files/vyhli12206/f/agendas/harbor_management_plan_update_draft_20230612.pdf.
- CP&O. 2024. CP&O is the premier operator at the Port of Virginia. [accessed June 2024]. <https://www.cpando.com/>.

- Dockwa. 2024. About Ocean Alliance Docks-Gloucester. [accessed December 2024]. <https://dockwa.com/explore/destination/95c7d6m-ocean-alliance-docks-gloucester?form=inquiry>.
- Eastern Connecticut Chamber of Commerce. 2021. *Embracing the Potential of Offshore Wind in Connecticut – A Study of Opportunities and Challenges*. McAllister Marine Engineering, LLC. [accessed 25 June 2024]. https://chamberect.com/wp-content/uploads/2021/12/CT-OSW-Strategic-Study-Final-12.22.21_reduced1.pdf.
- Equinor. 2024. Groundbreaking at South Brooklyn Marine Terminal to transform port into NYC offshore wind hub. [accessed 10 June 2024]. <https://www.equinor.com/news/us/groundbreaking-at-south-brooklyn-marine-terminal-to-transform-port-into-nyc-offshore-wind-hub>.
- Fort Point Associates. 2022. Expanded Environmental Notification Form - Salem Wind Port, Salem Massachusetts. Prepared for Crowley Wind Services, Inc.
- Freight Net. 2024. Mariners Harbor Cargo Terminal Service Inc. [accessed December 2024]. <https://www.freightnet.com/profile/143077.htm>.
- GA Ports. 2023. Colonel’s Island Terminal. [accessed 5 December 2023]. <https://gaports.com/facilities/port-of-brunswick/colonels-island-terminal/>.
- Gateway Terminal. 2024. Terminal Overview. [accessed June 2024]. <https://gatewayt.com/gateway-terminal-overview>.
- Holt Logistics. 2023. Gloucester Marine Terminal. [accessed 1 November 2023]. <https://www.holtlogistics.com/port-operations/gloucester-marine-terminals/#:~:text=The%20Gloucester%20Marine%20Terminal%20offers,Customs%20and%20USDA%20inspection%20facility>.
- Holt Logistics. 2024. Paulsboro Marine Terminal. [accessed December 2024]. <https://www.holtlogistics.com/facilities/paulsboro-marine-terminal/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed various dates 2023–2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Habib and Associates. 2022. *Arthur Kill Terminal (AKT) Environmental Assessment Statement*. 14 November 2022. Prepared for Arthur Kill Terminal LLC.
- Hampton Roads Alliance. 2023. Fairwinds Landing Begins Construction of Offshore Wind Monitoring & Coordination Center in Norfolk, VA. [accessed September 2024]. <https://hamptonroadsalliance.com/news/fairwinds-landing-begins-construction-of-offshore-wind-monitoring-coordination-center-in-norfolk-va/>.
- HDR Engineering. 2023. Draft Environmental Impact Statement: Radio Island Multi-Use Terminal, Morehead City, Carteret County. [accessed September 2024].
- IMTT. 2024. Bayonne, NJ. [accessed December 2024]. <https://imtt.com/terminals/bayonne-nj/>.
- Kinder Morgan. 2024a. Carteret Terminal. [accessed December 2024]. <https://www.kindermorgan.com/WWWKM/media/Terminals/Northeast-Carteret.pdf>.

- Kinder Morgan. 2024b. Linden Terminal. [accessed December 2024].
<https://www.kindermorgan.com/WWWKM/media/Terminals/Northeast-Linden.pdf>.
- Kinder Morgan. 2024c. Perth Amboy Terminal. [accessed December 2024].
<https://www.kindermorgan.com/WWWKM/media/Terminals/Northeast-Perth-Amboy.pdf>.
- Magnusen and Colgan. 2021. The Economic Impact of the Piscataqua River and the Ports of Portsmouth and Newington. June 2021.
- Mass Coastal Railroad. 2020. Multimodal Connections. [accessed October 2024].
<https://masscoastal.com/services/multimodal-connections/>.
- Massachusetts Clean Energy Council. 2017. 2017 Massachusetts Offshore Wind Ports & Infrastructure Assessment.
- MassPort. 2022. Port of Boston Fact Sheet. <https://massport.com/conley-terminal/>. [accessed August 2023].
- MassPort. 2023. Conley Terminal Specifications. <https://www.massport.com/conley-terminal/at-the-terminal/terminal-specifications>. [accessed November 2023].
- Maxim Cranes. 2023. Unlocking the Power of Gantry Cranes.
<https://www.maximcrane.com/blog/unlocking-the-power-of-gantry-cranes/>. [accessed August 2024].
- Moffat & Nichol. 2020. *New London State Pier - Basis of Design*. Prepared for North East Offshore LLC. January 28, 2020.
- Moffat & Nichol. 2021. Maine Department of Transportation: Offshore Wind Port Infrastructure Feasibility Study, Concept Design Report. Prepared for Maine Department of Transportation.
- Moran Shipping. 2024a. Buckeye Terminal Port Reading. [accessed December 2024].
<https://www.moranshipping.com/locations/ports/new-york-ny/terminals/buckeye-terminal-port-reading>.
- Moran Shipping. 2024b. Energy Transfer Marcus Hook. [accessed December 2024].
<https://www.moranshipping.com/locations/ports/wilmington-de/terminals/sun-oil-marcus-hook-pa>.
- [NJEDA] New Jersey Economic Development Authority. 2020. The New Jersey Wind Port - Technical Information for Offshore Wind Developers and Component Manufacturers. [accessed August 2024].
<https://nj.gov/windport/about/pdf/NJWPTechnicalInformationPackage.pdf>.
- [NYSERDA] New York State Energy Research and Development Authority. 2019a. *2018 Ports Assessment: Port of Albany-Rensselaer - Pre-front End Engineering Design Report*.
- [NYSERDA] New York State Energy Research and Development Authority. 2019b. *2018 Ports Assessment: South Brooklyn Marine Terminal*. Prepared by COWI North America, Inc. [accessed March 2024]. <https://www.nyserdera.ny.gov/-/media/Project/Nyserda/Files/Programs/Offshore-Wind/Resource-Library/Port-South-Brooklyn-Marine-Study.pdf>.
- New York Waterway. 2024a. Hoboken / NJ Transit Terminal. [accessed December 2024].
<https://www.nywaterway.com/hobokennjtransitterminalterminal.aspx>.

- New York Waterway. 2024b. South Amboy Ferry Terminal. [accessed December 2024]. <https://www.nywaterway.com/SouthAmboyTerminal.aspx>.
- New York Waterway. 2024c. Port Imperial/Weehawken. [accessed December 2024]. <https://www.nywaterway.com/portimperialweehawkenterminal.aspx>.
- [NOAA] National Oceanic and Atmospheric Administration. 2009. Nautical Chart No. 13232. 63rd Edition. [updated 5 September 2023; accessed June 2024]. <https://charts.noaa.gov/PDFs/13232.pdf>.
- [NOAA] National Oceanic and Atmospheric Administration. 2010a. Nautical Chart No. 13281. 19th Edition. [updated 4 January 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2010b. Nautical Chart No. 12345. 11th Edition. [updated 31 July 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2012. Navigation Chart No. 12371. 25th Edition. [updated 28 October 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2013a. Navigation Chart No. 13298. 11th Edition. [updated 15 April 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2013b. Navigation Chart No. 13213. 43rd Edition. [updated 4 October 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2013c. Navigation Chart No. 13226. 8th Edition. [updated 5 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2013d. Navigation Chart No. 12337. 24th Edition. [updated 16 August 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2013e. Navigation Chart No. 11502. 34th Edition. [updated 18 April 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2014a. Navigation Chart No. 12369. 27th Edition. [updated 6 December 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2014b. Navigation Chart No. 12331. 33rd Edition. [updated 27 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2014c. Navigation Chart No. 11470. 40th Edition. [updated 17 October 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2015a. Navigation Chart No. 12289. 51st Edition. [updated 6 April 2016; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2015b. Navigation Chart No. 11524. 54th Edition. [updated 6 April 2016; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2016. Navigation Chart No. 13309. 30th Edition. [updated 29 November 2023; accessed June 2024].

- [NOAA] National Oceanic and Atmospheric Administration. 2017a. Navigation Chart No. 12253. 48th Edition. [updated 5 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2017b. Navigation Chart No. 12325. 6th Edition. [updated 17 October 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2017c. Navigation Chart No. 11488. 29th Edition. [updated 19 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2017d. Navigation Chart No. 11468. 45th Edition. [updated 29 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2018a. Navigation Chart No. 13292. 42nd Edition. [updated 30 August 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2018b. Navigation Chart No. 12312. 58th Edition. [updated 22 January 2024; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2018c. Navigation Chart No. 12281. 57th Edition. [updated 12 February 2024; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2018d. Navigation Chart No. 13270. 66th Edition. [updated 17 February 2024; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2018e. Navigation Chart No. 12312. 58th Edition. [updated 31 October 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2019a. Navigation Chart No. 13224. 41st Edition. [updated 15 December 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2019b. Navigation Chart No. 13221. 63rd Edition. [updated 28 July 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2019c. Navigation Chart No. 12311. 48th Edition. [updated 5 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2019d. Navigation Chart No. 11490. 22nd Edition. [updated 5 August 2022; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2020a. Navigation Chart No. 12334. 74th Edition. [updated 13 July 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2020b. Navigation Chart No. 13283. 24th Edition. [updated 5 September 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2020c. Navigation Chart No. 12333. 38th Edition. [updated 16 August 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2020d. Navigation Chart No. 12334. 47th Edition. [updated 31 July 2023; accessed June 2024].

- [NOAA] National Oceanic and Atmospheric Administration. 2020e. Navigation Chart No. 12245. 71st Edition. [updated 20 October 2023; accessed June 2024].
- [NOAA] National Oceanic and Atmospheric Administration. 2020f. Navigation Chart No. 11506. 47th Edition. [updated 4 August 2020; accessed June 2024].
- Norfolk Southern. 2024. Lambert’s Point Docks Brochure. [accessed September 2024]. https://www.norfolksouthern.com/content/dam/nscorp/pdf/LPD_brochure.pdf.
- North Carolina Ports. 2021. Facilities Guide. [accessed May 2024]. https://ncports.com/wp-content/uploads/2021/10/Facilities_Guide_5.0_Oct.2021.pdf.
- [NCSPA] North Carolina State Ports Authority. 2024. State Record of Decision: Radio Island Multi-Use Terminal, Morehead City, Carteret County. [accessed July 2024]. https://ncports.com/wp-content/uploads/2024/03/NCSPA_Radio-Island_ROD_20240228.pdf.
- Paulsboro Marine Terminal. 2023. Paulsboro Marine Terminal. [accessed February 2024]. <https://www.southjerseyport.com/facilities/paulsboro-marine-terminal/>.
- Penobscot Bay River and Pilots Association. 2023a. Port of Bangor / Brewer, Maine – Penbay Pilot. [accessed December 2023]. <https://www.penbaypilots.com/ports/port-of-bangor-brewer-maine/>.
- Penobscot Bay River and Pilots Association. 2023b. Port of Searsport Maine. [accessed December 2024]. <https://www.penbaypilots.com/ports/port-of-searsport-maine/>.
- Philadelphia Port. 2021. Tioga Marine Terminal. [accessed March 2024]. <https://www.philaport.com/facilities/tioga-marine-terminal/>.
- Port Everglades. 2024. Facilities. [accessed December 2024]. <https://www.porteverglades.net/cargo/facilities/>.
- Port of Albany. 2024. Facilities. [accessed May 2024]. <https://www.portofalbany.us/what-we-do/facilities/#terminal>.
- Port of Fernandina. 2024. Port Features. [accessed December 2024]. <https://www.portoffernandina.org/port-features>.
- Port of Jacksonville. 2024. Technical Specifications. [accessed December 2024]. <https://www.jaxport.com/cargo/facilities/tech-specs/>.
- Port of New York and New Jersey. 2023. Container Terminals. [accessed April 2024]. <https://www.panynj.gov/port/en/our-port/container-terminals.html>.
- Port Wilmington. 2023. About Us: Port Wilmington. [accessed June 2024]. <https://portwilmington.com/about-port-wilmington/>.
- Ports America. 2023a. Port of Brooklyn New York. [accessed December 2023]. <https://www.portsamerica.com/locations/portofbrooklyn-new-york>.
- Ports America. 2023b. Port of Norfolk Virginia. [accessed December 2023]. <https://www.portsamerica.com/locations/portofnorfolk-virginia>.

Ports America. 2023c. Port of Boston – Flynn Cruise Terminal. [accessed December 2023]. <https://www.portsamerica.com/our-locations/boston-ma?terminal=flynn-cruiseport>.

Ports America. 2023d. Port of Jersey City New Jersey. [accessed December 2023]. <https://www.portsamerica.com/locations/portofjersey-city-new-jersey>.

Ports America. 2023e. Port of Newark New Jersey. [accessed December 2023]. <https://www.portsamerica.com/locations/portofnewark-new-jersey>.

Ports America. 2023f. Port of Philadelphia Pennsylvania. [accessed December 2023]. <https://www.portsamerica.com/locations/portofphiladelphia-pennsylvania>.

Ports America. 2023g. Port of Charleston South Carolina. [accessed December 2023]. <https://www.portsamerica.com/locations/portofcharleston-south-carolina>.

Ports America. 2023h. Port of Miami Florida. [accessed December 2023]. <https://www.portsamerica.com/locations/portofmiami-florida>.

Ports America. 2023i. Port of Port Everglades Florida. [accessed December 2023]. <https://www.portsamerica.com/locations/portofporteverglades-florida>.

Ports America. 2023j. Port of Savannah Georgia. [accessed December 2023]. <https://www.portsamerica.com/locations/portofsavannah-georgia>.

Ports America. 2023k. Newark NJ. [accessed December 2024]. <https://www.portsamerica.com/our-locations/newark-nj?terminal=port-newark-container-terminal> and <https://www.portsamerica.com/our-locations/newark-nj?terminal=port-newark-auto-terminal>.

Ports America. 2023l. Miami FL. [accessed December 2024]. <https://www.portsamerica.com/our-locations/miami-fl?terminal=miami-stevedoring>.

Port of Providence. 2024. Facilities Overview. [accessed May 2024]. https://www.provport.com/provport/facilities_overview.html.

Ports.com. 2024a. Port Socony Reach, United States. [accessed December 2024]. <http://ports.com/united-states/port-socony-reach/>.

Ports.com. 2024b. Stapelton Pier, United States. [accessed December 2024]. <http://ports.com/united-states/stapleton-pier/>.

Ports.com. 2024c. Port of Yonkers, United States. [accessed December 2024]. <http://ports.com/united-states/port-of-yonkers/>.

PSA Penn Terminals. 2024. About Us. [accessed December 2024]. <https://psa-pennterminals.com/about.htm>.

Quonset Development Corporation. 2024. Port of Davisville – Port Facilities. [accessed April 2024]. <https://quonset.com/port-facilities/>.

Redhook Terminals. 2024. Redhook Container Terminal, Brooklyn New York. [accessed December 2024]. <https://www.redhookterminals.com/red-hook-container-terminal>.

- Rhode Island Turnpike and Bridge Authority. 2018. History – Claiborne Pell Bridge. [accessed April 2024]. <https://www.ritba.org/history>.
- S&P Global. 2024. *Ports and Terminals Guide 2023-2024*. S&P Global Maritime Portal. [accessed April 2024].
- Sea Magazine. 2024. Rhode Island State Pier #9. [accessed December 2024]. <https://www.seamagazine.com/locations/marina-rhode-island-state-pier-9-newport-rhode-island-14172>.
- SeaRates. 2023. United States Sea Ports. [accessed July 2024]. https://www.searates.com/maritime/united_states.
- Southeastern Connecticut Enterprise Region. 2024. Barnum Landing. [accessed July 2024]. <https://www.secter.org/wind-projects/barnum-landing/>.
- Skanska. 2022. Skanska selected to rebuild offshore wind staging port at Portsmouth Marine Terminal. [accessed September 2024]. <https://www.usa.skanska.com/who-we-are/media/press-releases/266239/Skanska-selected-to-rebuild-offshore-wind-staging-port-at-Portsmouth-Marine-Terminal->.
- Thalhimer. 2022. *The Miller Group Leases Lambert’s Point Docks, the Largest Privately-Held Multi-Modal Facility in the Norfolk Region*. Prepared for Cushman and Wakefield. [accessed September 2024]. <https://thalhimer.com/marketwatch/our-blog/the-miller-group-leases-lamberts-point-docks-the>.
- Town of South Kingston RI. 2010. Harbor Management Plan. [accessed December 2024]. http://www.crmc.ri.gov/harbormanagement/HMP_SouthKingstown.pdf.
- Tradepoint Atlantic. 2020. Tradepoint Marine. [accessed August 2024]. <https://www.tradepointatlantic.com/wp-content/uploads/2020/06/TPA-Marine-v4.pdf>.
- Tradepoint Atlantic. 2021. Offshore Wind Factsheet. [accessed August 2024]. <https://www.tradepointatlantic.com/wp-content/uploads/2021/08/Offshore-Wind-2021v2.pdf>.
- Tradepoint Atlantic. 2024. Why Tradepoint. [accessed August 2024]. <https://www.tradepointatlantic.com/why-tradepoint/>.
- [USACE] U.S. Army Corps of Engineers. 2023. *Federal Public Notice NAO-2009-02374 – Portsmouth Marine Terminal, Portsmouth, Virginia*. Published 11 January 2023. [accessed August 2024]. <https://www.nao.usace.army.mil/Media/Public-Notices/Article/3260647/nao-2009-02374-portsmouth-marine-terminal-portsmouth-virginia/>.
- Vestas. 2024. Vestas is readying New York for offshore wind and moves forward conditional agreement for the Empire Wind 1 project. Published 5 March 2024. [accessed July 2024]. <https://www.vestas.com/en/media/company-news/2024/vestas-is-readying-new-york-for-offshore-wind-and-moves-c3941164>.
- National Geospatial-Intelligence Agency. 2019. *World Port Index – Pub. 150*. 27th Edition. [accessed May 2024]. <https://msi.nga.mil/api/publications/download?key=16694622/SFH00000/Pub150bk.pdf&type=view>.
- World Port Source. 2023. Various ports. [accessed June–September 2024]. <http://www.worldportsource.com/ports>.

Appendix B: Port Profiles

A profile was developed for each of the following ports:

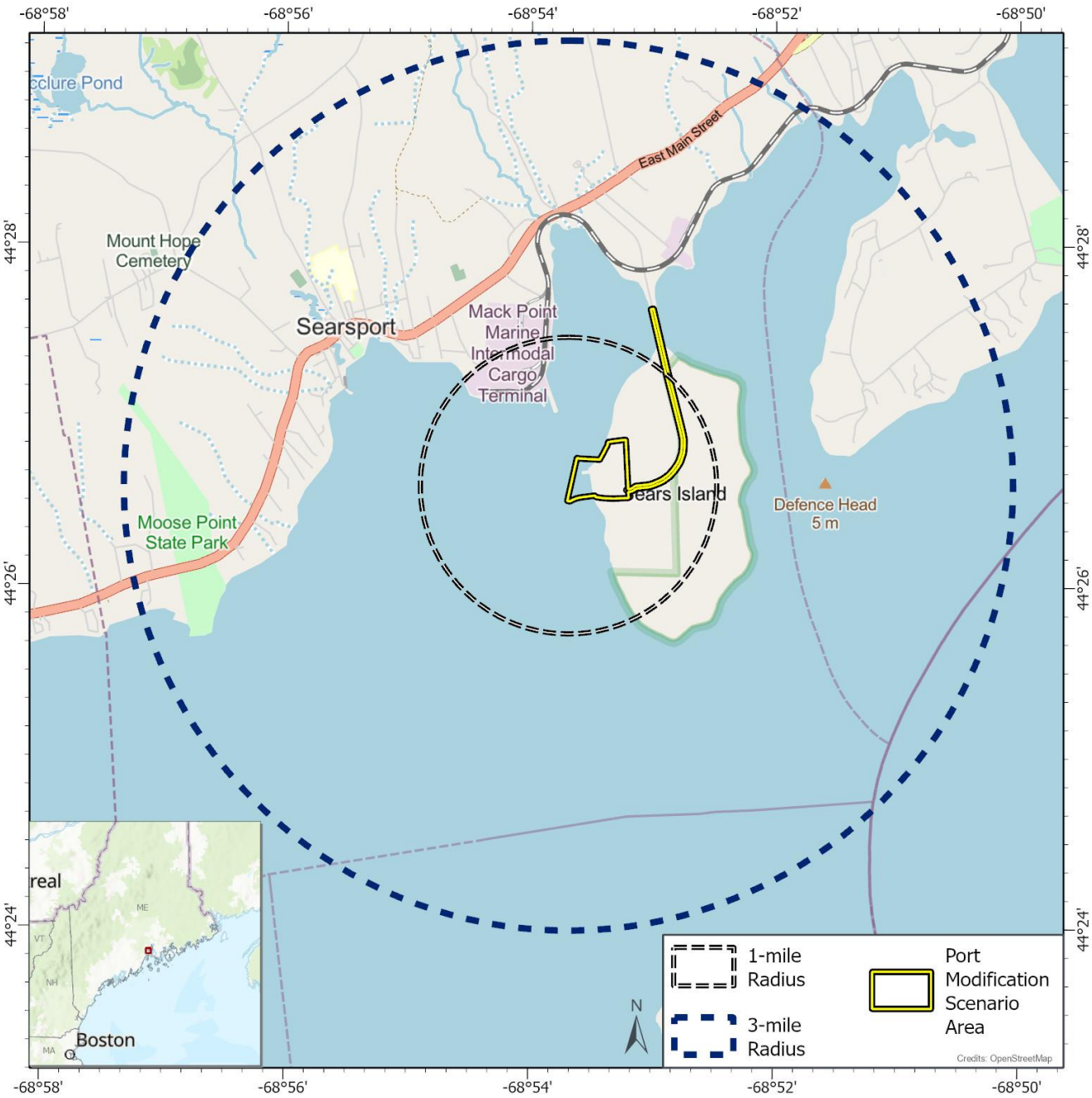
- Searsport (Sears Island), Maine
- Portland, Maine
- Salem, Massachusetts
- Providence (East Quay), Rhode Island
- Quonset Point/Davisville, Rhode Island
- New Haven, Connecticut
- Bridgeport, Connecticut
- Albany, New York
- Brooklyn (South Brooklyn Marine Terminal), New York
- Arthur Kill, New York
- New Jersey Wind Port (Lower Alloways Creek), New Jersey
- Baltimore (Tradepoint Atlantic), Maryland
- Hampton Roads (Portsmouth and Norfolk), Virginia
- Wilmington, North Carolina
- Morehead City (Radio Island), North Carolina

SEARSPORT PORT PROFILE

Searsport, Maine – 4°26'35" N, 68°53'41" W

Bureau of Ocean Energy Management

December 18, 2024



SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

1 Port Overview

Owner:	Maine Port Authority (S&P Global 2024)
Operator:	Maine Port Authority, Sprague Energy (S&P Global 2024)
Primary Existing Uses:	Commercial shipping
Primary Existing Cargo:	General and liquid cargo, break bulk
Existing Port Employment:	Not provided by Maine Port Authority
Typical Operating Hours:	24 hours per day, 7 days per week (Sprague Energy 2024)
Terminal Land Area:	Approximately 11 acres
Closest Wind Energy Lease Area:	Equinor Wind US LLC (OCS-A 0563)
Distance to Closest Lease Area:	Approximately 85 miles
Potential Offshore Wind Port Uses:	Floating foundation assembly/marshalling port

The Port of Searsport is located in Searsport, Maine, and is the primary port within Penobscot Bay (Penobscot Bay & River Pilots Association 2024). The port has two existing terminals: the Sprague Energy terminal at Mack Point, which includes one berth for general cargo and a second berth for general and liquid cargo; and the Searsport Marine Terminal, which is operated by Maine Port Authority and is used for general cargo (S&P Global 2024).

In 2020, the Governor of Maine, Janet Mills, directed the Maine Department of Transportation (MaineDOT) to study the feasibility of constructing a “hub” port in Maine to support offshore wind development (Moffat & Nichol 2021). Moffat & Nichol identified two primary sites in Searsport for the study – Mack Point and Sears Island. Following review of the feasibility study and input from the public and other stakeholders, in February 2024, Governor Mills announced that her administration had selected Sears Island as the preferred site for development of an offshore wind port (Maine Public 2024).

The 940-acre island is owned by the State of Maine (via MaineDOT) and is undeveloped, largely flat, and wooded (Moffat & Nichol 2021). The island is composed of two primary parcels, a state-protected conservation parcel, and a 330-acre parcel reserved for MaineDOT, which was established via executive order by then Governor of Maine John Baldacci in 2009 (Maine Public 2024).

Marine access to Sears Island through Penobscot Bay includes transit via two National Oceanic and Atmospheric Administration (NOAA) Recommended Vessel Routes, as depicted on NOAA Nautical Chart 13309 (NOAA 2016). Due to the existing water depths within Penobscot Bay, there is only a small federally maintained navigation channel/basin near the approach to the existing Port of Searsport, which is north of the western side of Sears Island. This small segment of navigation channel is depicted on Nautical Chart 13309 (NOAA 2016).

Moffat & Nichol investigated the bathymetry around Sears Island and noted that the required depths (including a buffer) to support floating foundation assembly and float-out can be met without dredging at the site (Moffat & Nichol 2021). There are no existing bridges, overhead utilities, or other air draft restrictions on either the Sears Island site or the NOAA Recommended Vessel Routes through Penobscot Bay (NOAA 2016); therefore, the site has been targeted as a floating (or fixed) foundation assembly and marshalling port. Because the port requirements for floating foundations are more stringent than those for fixed foundations, this evaluation is focused on the conceptual design for a floating foundation assembly port. In addition, approximately 89% of the wind energy potential in the Gulf of Maine is in deep water (deeper than approximately 200 feet), which is considered “ideal” for floating wind turbine technology (DNV 2022a).

There is approximately 9,000 linear feet of undeveloped water frontage at Sears Island (Moffat & Nichol 2021). MaineDOT performed a geotechnical investigation of the Sears Island parcel in 1983, which included a series of borings within and adjacent to the proposed Sears Island site, and described the soils as generally consisting of a 3-foot layer of topsoil overlying a 12- to 16-foot-thick layer of silty till (Moffat & Nichol 2021).

Existing capabilities at Sears Island are summarized in Table 1-1.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Table 1-1. Existing Capabilities (Sears Island)

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	None (undeveloped)
	Port Access Channel Controlling Depth (feet)	49
	Overhead / Air Draft Restriction (feet)	Unlimited
	Number of Berths	None (undeveloped)
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	None (undeveloped)
	Length (feet)	9,000
	Depth (feet)	49
	Suitable for Spud-Jacking (Yes/No)	Unknown (site not assessed) (Elkinton et al. 2014)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	300
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Not provided by Maine Port Authority
	Haul Route Area Bearing Capacity (mt/m ²)	Not provided by Maine Port Authority
	Approx. Size of Covered Storage Area (acres)	None (undeveloped)
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	Undeveloped
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	None (undeveloped)
	Height Restrictions	Unlimited
Transportation	On-Site Rail (Yes/No)	No
	On-Site Highway (Yes/No)	No

Source: Moffat & Nichol (2021) unless otherwise noted.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The feasibility study developed for MaineDOT by Moffat & Nichol (2021) included a two-phase conceptual layout for the Sears Island offshore wind port, which is the basis of the proposed port modifications evaluation.

Planned modifications required for use to support offshore wind as a floating foundation assembly/marshalling port include the following: under the proposed first phase of construction, approximately 600 linear feet of quay would be constructed from coffer dams approximately 600 to 700 feet west of the existing shoreline. A heavy lift platform with a ground bearing capacity of 5,000 pounds-per-square-foot (psf) would be constructed from fill excavated from the adjacent upland. The adjacent upland area (approximately 44 acres in size) would be used for laydown and staging with a proposed ground bearing capacity of 3,000 psf.

Under the second phase of development, an additional approximately 960 linear feet of quay would be constructed from coffer dams, extending the quay towards the south from phase 1 construction. Additional upland material and imported material would be used to construct an additional approximately 14 acres of heavy lift area. The heavy lift platform that extends into Penobscot Bay would be protected from tides, waves, and other hydrodynamic forces by construction of an armored side slope revetment on the north and south faces of the platform.

Port modifications would also include the construction of a new multi-lane road to connect the terminal to existing infrastructure and roads on the mainland. A stormwater collection and management system would be installed, as well as lighting and other utilities.

Construction of the coffer dams under Phases 1 and 2 would include the construction of 100-foot diameter cells, filled with soil excavated from the adjacent upland. The coffer dams would be constructed by driving or drilling steel or composite piles into existing bedrock, followed by the installation of steel sheet piles. At the top of the coffer dams, a layer of compacted dense graded aggregate would be placed, followed by a layer of pavement. The

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

coffer dams will form the foundation of the quay and would be constructed to handle the required significant loading levels (Moffat & Nichol 2021). A mobile, land-based crawler crane would operate on the quay.

Behind the coffer dams, to connect the quay to the upland area, an earthen embankment would be constructed from soils excavated from the adjacent uplands. The soils would be compacted, and a layer of dense aggregate bedding stone would be imported and placed prior to paving. Compaction of soils in the embankment (and upland) will be achieved via placement of soil surcharges over a time period of approximately 4.5 months (Moffat & Nichol 2021).

Approximately 44 total acres of the upland will be cleared, graded, and compacted to create a useable space for storage and laydown operations. A stormwater management and collection system as well as site utilities would also be installed over the upland and heavy lift areas. The concept also includes the construction and modification of an existing road to access the site from the mainland. A 100-foot-wide multi-lane road is proposed that would include land clearing, grading, importing, placement and compaction of fill and aggregate, and paving.

Total approximate quantities reported by Moffat & Nichol in their 2021 feasibility study include 880,000 cubic yards of material to be placed and compacted (including 755,000 cubic yards of soil excavated from Sears Island) and 34,000 tons of armor stone and dense aggregate, resulting in 1,560 linear feet of quay frontage, 21.5 acres of heavy lift area capable of supporting a 5,000-psf load, and 44 acres of storage and laydown capable of supporting loads of 3,000 psf (Moffat & Nichol 2021). As noted, no dredging is required to build out the port.

The primary impact driver during operation would be the emissions and disturbance generated by ships calling at the port, an increase in local terrestrial cargo transportation, and the presence and activities of workers at the port (i.e., because the Sears Island site is currently undeveloped, all new activity would represent an increase). Visual impacts related to construction and port operations are also expected to be significant, and will include large cranes, assembled floating foundations and towers, lighting from the port, and may include visual impacts to surrounding natural features such as surrounding land and seascapes for the local community and tribes, such as the view of Cadillac Mountain, located approximately 35 miles to the southeast of Sears Island.

2 Air Quality

The air quality screening characterizes the existing air quality in Waldo County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Waldo County, Maine, includes urban and rural areas with a low population density and a somewhat sizable industrial base. Emission sources within the boundaries of Waldo County, regional sources, and sources in neighboring metro areas affect the county's air quality. The Waldo County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Table 2-1. Emissions Inventory in Tons per Year for Waldo County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	180	36	12	5	–
Biogenics*	827	78	–	–	–	5,300	547	–
Dust	–	–	–	1,128	148	–	–	–
Fires	215	3	2	23	19	49	9	2,428
Fuel combustion	4,347	35	35	778	761	646	258	–
Industrial processes§	–	–	–	391	49	129	6	–
Miscellaneous†	504	19	5	115	105	344	61	–
Mobile	3,924	509	4	48	32	722	233	241,031
Point Sources	256	132	34	64	54	138	10	135,230
Total	10,073	1,047	79	2,725	1,204	7,371	1,129	378,690

Source: EPA (2023).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes include various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Waldo County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Waldo County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors are not located in Waldo County, so values from the southern-bordering Knox County were utilized. Knox County reported an O₃ design value of 60.7 parts per billion (ppb) on average for the 2019 to 2021 period, 59.7 ppb on average for the 2020 to 2022 period, and 59.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts during construction and operations would be the direct result of emissions from vehicles, and port machinery, as well as fugitive dust from earth moving activities. During the port construction activities, emissions would consist of both marine and land-based mobile sources. Marine emissions from channel widening/deepening involved with this project during construction is not required, so emissions from dredging or support vessels is not anticipated. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as on heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type and the following assumptions:

- Construction would occur over 7 years.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kilowatt/HP was used for all engines.
- Use of ultra-low sulfur fuel in the mobile sources.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	–	–	–	–	–	–	–	–
Nonroad Emissions	5.18	17.35	0.03	0.84	0.90	0.87	0.11	10,710.96
On-Road Emissions	4.31	0.31	<0.01	0.06	0.64	0.16	0.02	443.01
Fugitive Dust	–	–	–	–	7.27	0.72	–	–
Total	9.49	17.66	0.03	0.90	9.26	1.75	0.13	11,153.97

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from construction would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Operational marine emissions from channel widening/deepening involved with this project is not required, so emissions from dredging or support vessels are not anticipated. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, HP rating, assumed load factor, and fuel type and the following assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kilowatt/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.
- Use of ultra-low sulfur fuel in the mobile sources.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	–	–	–	–	–	–	–	–
Nonroad Emissions	–	–	–	–	–	–	–	–
On-Road Emissions	0.11	0.02	<0.01	<0.01	1.56	0.16	<0.01	13.48
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.33
Total	0.11	0.02	<0.01	<0.01	1.56	0.16	<0.01	13.81

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on PM_{2.5}, the greatest pollutant of concern, and compared against the Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the fill compaction phase accounting for the maximum hourly PM_{2.5} emissions. The resulting estimated region of influence was 12 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from project construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by potential port modifications consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials are made to the building, structure, or associated site features (e.g., on-site facilities or landscaping) occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of an historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affects integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features within the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers (SHPOs) and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: Review of confidential and publicly available reference sources identified no previously documented aboveground historic buildings and structures within 1 mile of the proposed Searsport modifications (Maine Historic Preservation Commission [MHPC] 2024; National Park Service [NPS] 2024; see Table 3-1). The modification scenario area does not appear to contain buildings in available, recent aerial imagery street views (Google Earth Pro 2024). However, aboveground historic buildings and structures associated with the Town of Searsport over 1 mile but less than 3 miles from the modification scenario area do have historic associations (MHPC 2024; NPS 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those being considered for port developments in this setting.

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Native American Pre-Contact, Contact, and Post-Contact and Historic period archaeological sites, are known to occur near Searsport and on Sears Island from publicly available resources (Bourque 1975; Friends of Sears Island 2024; Mosher and Spiess 2023). Older soils may persist undisturbed by historic agricultural and existing jetty developments based on described plans for Sears Island (Moffat & Nichol 2021). Three archaeological surveys have been conducted within a 1-mile radius of the modification scenario area (Bourque 1975; Cranmer and Spiess 1996; Mosher and Spiess 2023; Spiess and Hedden 1983). Four Pre-Contact archaeological sites were identified as shell middens and/or lithic scatters from confidential and publicly available resources (MHPC 2024; Mosher and Spiess 2023; Spiess and Hedden 1983). Two sites were identified from publicly available resources and may be associated with a Post-Contact Native American settlement (Mosher and Spiess 2023). Seventeen historic Euro-American archaeological sites, consisting of six cellar holes and 11 structural remains, were identified in confidential sources (MHPC 2024). One site was likely associated with a nineteenth-century fish processing station (MHPC 2024; Mosher and Spiess 2023). The Gulf of Maine region is notable for Pre-Contact, Contact, and Post-Contact Native American settlement as indicated by the Pentagoet Archaeological District. Publicly available documentation on this resource is available through a National Historic Landmark District that is located southeast of the modification scenario area but outside a 3-mile radius (NPS 2024).

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Marine Archaeological Resources: Four submerged wrecks were identified within a 3-mile radius, three of which were identified within a 1-mile radius from confidential data sets (MHPC 2024; NOAA 2024a). One NRHP-listed wreck was identified within 3 miles; it is listed as a Revolutionary War privateer and is associated with a collection held at the Maine State Museum (MHPC 2024; NOAA 2024a; Riess and Daniel 1997). Within 1 mile of the modification scenario area, three resources were identified as intertidal wrecks of early twentieth-century wooden vessels, and one wreck was identified as a late-nineteenth-century schooner (MHPC 2024).

Aboveground Historic Resources: There are at least 116 individual aboveground historic buildings and structures, and four historic districts listed in the publicly available NRHP list or the Maine Historic Preservation Commission (MHPC) Cultural Architectural Resource Management Archive (CARMA) within 3 miles of the modification scenario area (MHPC 2024; NPS 2024). These individual historic buildings and structures encompass NRHP-listed and NRHP-eligible resources (MHPC 2024). There are no aboveground historic buildings or structures, or historic districts listed on the NRHP or CARMA within 1 mile of the modification scenario area based on a search of publicly available databases (MHPC 2024; NPS 2024).

Review of publicly available aerial imagery and historic topographic maps of the area within 1 mile of the port indicate the presence of at least two map-documented aboveground structures that may be more than 50 years old (Google Earth Pro 2024; USGS 1941, 1973). Historic topographic map review within a 1-mile radius indicates two structures present in 1859 and 1902 that are no longer extant in 1941 or later maps (Town of Searsport 1859; USGS 1902, 1941, 1973). These structures are not identified on the NRHP or listed as NRHP-eligible on the state register (MHPC 2024; NPS 2024).

Cultural Resources Potential: Aerial imagery and historic topographic map review of the 1-mile study radius indicate the presence of potential cultural resources and historic structures near the modification scenario area (Google Earth 2024; MHPC 2024). Many of these historic areas, buildings, and structures relate to the emergence of Searsport as an historic fishing and shipping center during the eighteenth century and as it persisted historically through the nineteenth and twentieth centuries.

Unknown terrestrial archaeological resources are of high potential in the proposed modification scenario area and surrounding areas and could also occur adjacent in more deeply buried terrestrial and shoreline deposits or in undisturbed natural areas (wetlands, riparian zones, beaches). Post-Contact sites could occur at historical ruins. Marine archaeological resources were identified based on confidential and publicly available sources (MHPC 2024; NOAA 2024a; NPS 2024; Riess & Daniel 1997). Other unknown marine archaeological sites could occur in seafloor or beach sediments that are largely undisturbed by previous dredging, excavation, or coastal erosion; port modifications could affect these shoreline sediments and the seafloor during quay development. Aboveground historic resources within a 3-mile radius include four National Historic Districts and 116 individually NRHP-eligible or NRHP-listed resources (MHPC 2024; NPS 2024). Aboveground historic buildings and structures that are beyond 1 mile but within 3 miles of the modification scenario area are not expected to be subject to physical impacts from potential port modifications, and there are no known aboveground historic buildings located within a 1-mile radius.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as piledriving), or light.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the proposed port location. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{9,18,20}	• Located on the west side of an undeveloped island (Sears Island), comprising mixed forest habitat towards the interior and herbaceous wetland along the coastline. • Pockets of isolated forested wetlands and intermittent streams are present within 1 mile. • An industrialized port area is located 0.5 mile to the northwest on the mainland. • Additional wetlands and larger streams are within 3 miles on the mainland areas.
Shoreline Habitats ¹⁴	• A small riprap area along an isolated groin is within the modification scenario area; the remaining coastline is primarily mixed sand/gravel beaches, with a small area of tidal flat along the north coast. • Within 3 miles, the mainland coastline is diverse and includes vegetated banks, tidal flats, and some shoreline armoring, particularly around the existing mainland port.
Submerged Marine Habitats ^{7,8}	• Submerged Aquatic Vegetation patch within the modification scenario area, and patches around the perimeter of Sears Island. • Aquaculture lease area within 3 miles along the east side of Sears Island.
Designated Habitats/Places ^{10,11,13,15,16,17}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring; Bluefish; Northeast Skate Complex; Northeast Multispecies; Atlantic Sea Scallop; Atlantic Salmon; Habitat Areas of Particular Concern (HAPC) for Juvenile Cod. • Critical habitat for Atlantic sturgeon and Atlantic salmon within the Penobscot River Basin present approximately 2 miles east of Sears Island. • No Coastal Barrier Resources Areas or Important Bird Areas identified within 3 miles.
ESA Listed Species ^{12,19}	• Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. • Roseate terns: coastal islands within 1 mile. • Shortnose sturgeon, Atlantic sturgeon, and Atlantic salmon may occur within 1 mile. • Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles ¹⁹	• Bald eagles, along with 29 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals ¹⁵	• Biologically important area for resident population of harbor porpoises within 3 miles to the south; Atlantic bottlenose dolphins likely present near port.
State Specific Resources ^{1,2,3,4,5,6,21}	• Habitat area for the Eastern Ribbon Snake (Maine Species of Special Concern) located directly adjacent to the modification scenario area. • Tidal Waterfowl and Wading Bird Habitat areas within the modification scenario area and along the coast of the island, and along mainland shorelines within 3 miles. • Directly adjacent to the modification scenario area, the Maine Heritage Trust manages a ~440-acre conservation easement, occupying approximately 50% of Sears Island. • Moose Point State Park is located to the west within 3 miles of the modification scenario area, on the mainland, along with smaller easement areas.

Sources: ¹Maine Department of Inland Fisheries and Wildlife (MDIFW) 2018a; ²MDIFW 2018b; ³MDIFW 2018c; ⁴MDIFW 2018d; ⁵MDIFW 2018e; ⁶MDIFW 2018f; ⁷Maine Department of Marine Resources (MDMR) 2018a; ⁸MDMR 2018b; ⁹Multi-Resolution Land Characteristics Consortium 2021; ¹⁰National Audubon Society 2024; ¹¹NOAA 2021; ¹²NOAA 2022a; ¹³NOAA 2023a; ¹⁴NOAA 2023b; ¹⁵NOAA 2023c; ¹⁶NOAA 2023d; ¹⁷U.S. Fish and Wildlife Service (USFWS) 2023a; ¹⁸USFWS 2023b; ¹⁹USFWS 2024; ²⁰U.S. Geological Survey (USGS) 2022; ²¹USGS 2024.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

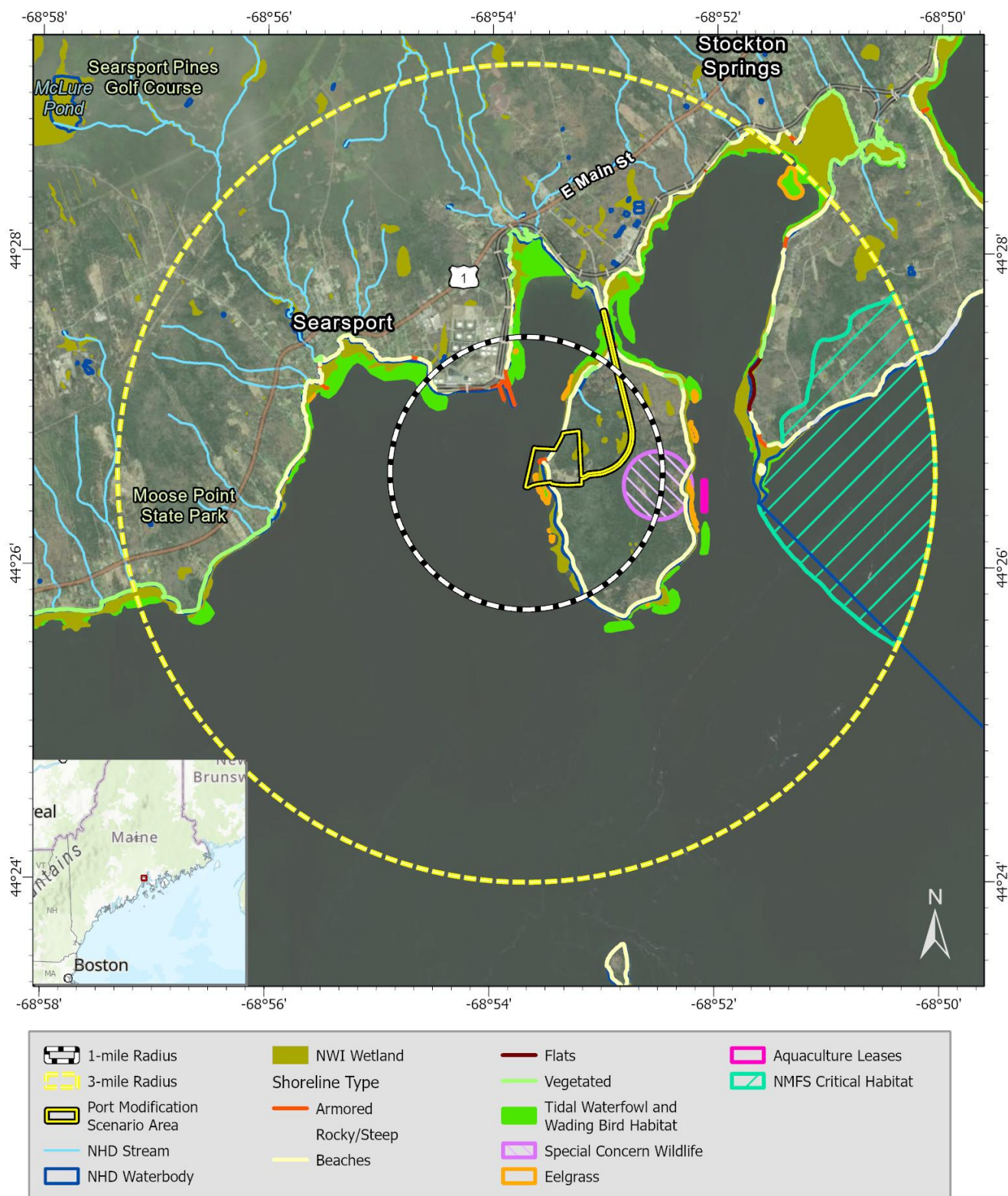


Figure 4-1. Existing habitats and natural resource areas.

Sources: MDIFW 2018e, 2018f; MDMR 2018a, 2018b; NOAA 2023d, 2024b; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition; soil disturbance/erosion; dewatering	Sediment disturbance and temporary increase in turbidity for pile driving/drilling, coffer dam dewatering, land construction activities associated with new berth.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of ~65 acres due to clearing for fill excavation, infrastructure/laydown areas, and roads.
Onshore Aquatic Habitats	Aquatic habitat alteration	Permanent loss of ~5 acres of forested wetlands for onshore infrastructure and access.
Shoreline	Habitat alteration	Permanent loss of sand/gravel beach shoreline and a small section of riprap within the modification scenario area; however, this beach shoreline type is fairly ubiquitous along the perimeter of the island.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	- Permanent loss of ~25 acres of benthic habitat and resources, including 1 acre of eelgrass for the construction of the offshore infrastructure. - The ~25 acres are inclusive of HAPC for juvenile cod, ubiquitous throughout the region.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	- Temporary acoustic impacts from construction vessel operation and pile driving (impulsive) activities leading to temporary behavioral changes. - Increased risk of injury or mortality due to vessel/equipment interaction. - Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	- Temporary acoustic impacts from construction vessel operation. - Temporary acoustic impacts due to pile driving/drilling activities leading to temporary behavioral changes. - Increased risk of injury or mortality due to vessel/equipment interaction. - Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	- Temporary acoustic impacts from construction vessel operation and pile driving/drilling activities leading to temporary behavioral changes. - Increased risk of injury or mortality due to vessel/equipment interaction. - ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances.
Other Terrestrial Biota	Terrestrial noise	Impacts due to construction and operations noise may occur due to presence of state species of concern directly adjacent to the modification scenario area.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in recreational, business, and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

Industrial visual elements would be introduced to Sears Island’s currently undeveloped landscape. This could be disruptive to both residential and recreational settings. Some mitigation may be possible including management of light sources and color schemes.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Within a 5-mile radius: the immediate vicinity on Sears Island is characterized by forest cover with some rangeland. The broader surrounding areas feature built-out residential and commercial zones interspersed with additional forest cover and rangeland. Industrial operations are concentrated at the nearby Mack Point (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	U.S. 1 is within 3 miles of the modification scenario area (Esri 2023), as are industrial facilities at the nearby Mack Point (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	None present (ArcGIS Online 2020).	None – Special use areas would not be affected	In the proposed port modification scenario, special use areas would not be affected.
Visual	The port property is directly visible from nearby residential and recreational areas adjacent to the port (Google Maps 2024).	Cranes 100–200 feet tall, land alterations during construction; lights and vessel activity during operation.	Activities during construction and operation would be adjacent to residential and recreational areas. Tall cranes may be widely visible. Operational lighting may be visible.
Noise	Noise levels are medium within 5 miles of the port, ranging from 45 decibels to 70 decibels. The highest noise is along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. Operation noise generally dissipates within 0.5 mile, not reaching the closest residential areas. However, adjacent recreational areas within this 0.5-mile radius will experience some impact.
Air Quality	The EPA reports 6 of 6 air quality metrics within 5 miles of the port are below the 50th percentile nationally. Asthma risk is in the 75th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening, though port-specific air quality analyses and monitoring would be required for final determination.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 21st percentile nationally.	Project-related traffic.	Up to 85 additional personal vehicles per day. The traffic associated with the creation of up to 110 jobs would be added to a town that employs 1,522.
Maritime Navigation	The nearest marine highway is the Atlantic Deep Water Spine (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment. Operational impacts dependent upon port usage
Commercial Shipping	The proposed port on Sears Island currently has no shipping activity. The adjacent port of Mack Point Port focuses on seaweed, gypsum, road salt, wood pellets, and heating oil. Rail and road transportation facilities exist within port boundaries (Penobscot Bay & River Pilots Association 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Fishing	Searsport is not a "Top US" commercial fishing port (NOAA 2022b). Engagement score for Searsport: low (NOAA 2020). Reliance score for Searsport: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	Sears Island and Searsport Town Landing offer boat access, shore, and road fishing. Engagement score for Searsport: medium (NOAA 2020). Reliance score for Searsport: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area overlaps with recreational ports/harbors. However, material impacts to recreationally fished stocks not anticipated.
Recreational Resources	There are parks/protected areas, including state park land and conservation areas, easements, and federal marine protected areas, within 5 miles of the port. Mixed sand and gravel beaches are directly adjacent to port site (Google Maps 2024; USGS 2024).	Noise emissions, visual alterations, terrestrial traffic, habitat and land use alterations.	Noise emissions and visual alterations may diminish visitor experiences by disrupting the natural tranquility and scenic views of nearby recreational areas.
Tourism	1,180 persons (6.4% of employed persons) within the county are employed in "arts, entertainment, recreation, accommodations, and food services" (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Increased port traffic could increase congestion near closest recreational areas.
Housing and Lodging	233 of the 4,749 vacant housing units in the county are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging availability for project workers during construction and operation is generally sufficient, with minimal conflicts expected.
Population	The population is 3,966 within 5 miles of the port and is low density. The population within the county is 33,437 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The 110 full-time workers during 5-year construction would not materially increase county population. The creation of 110 new jobs could draw workers to the county; the effect would be immaterial to a 33,437-person population.
Labor Force and Employment	The civilian labor force of the county is 19,401 and employment is 18,460. The unemployment rate is 4.6% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A construction workforce of 20–85 workers and an operational workforce of 110 introduced to a 19,401-person labor force with 4.6% unemployment would not likely cause a measurable change in unemployment.
Income Levels	The per-capita income is \$35,915 within 5 miles of the port and is \$31,997 within the county (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A construction workforce of 20–85 workers at prevailing wage levels would not materially alter income levels. Creation of 110 jobs in a 19,401-person labor force with 4.6% unemployment could result in a measurable increase in income levels.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Community Cohesion	The community cohesion indices for the three nearest counties are at the 37th, 71st, and 63rd percentiles, respectively. The county where the port is located, ranking at the 37th percentile, shows cohesion below the national median, while the other two counties exhibit above-average cohesion (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2023 total revenue for Maine was \$5.3 billion (Maine Department of Administrative and Financial Services 2023).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports no hospitals, and four schools are within 5 miles of the port. About 26% of the county population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small as would the change in risk related to large-scale industrial accidents.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 April 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 30 April 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Bourque BJ. 1975. *Report on Archeological Survey and Salvage at Sears Island and Kidder Point, Sears Island, Maine*. Augusta (ME): Maine State Museum.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Cranmer L, Spiess AE. 1996. *Phase I and Phase II Archaeological Survey of Sears Island and Kidder Point, PIN 99.10*. Augusta (ME): Maine Historic Preservation Commission.
- DNV. 2022a November. *Wind Energy Needs Assessment*. Prepared for the Maine Governor’s Energy Office and Maine Offshore Wind Roadmap.
- DNV. 2022b December. *Maine Offshore Wind Socioeconomic Analysis Final Report – Socioeconomic Analysis of Offshore Wind in the Gulf of Maine*. Prepared for the Maine Governor’s Energy Office and Maine Offshore Wind Roadmap.
- DNV. 2022c. *Socioeconomic Analysis of Offshore Wind in the Gulf of Maine*. Maine Governor’s Energy Office, Maine Offshore Wind Roadmap. [accessed 2 May 2024]. <https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Socioeconomic%20Analysis%20of%20Offshore%20Wind%20in%20the%20Gulf%20of%20Maine%20Final%20Report.pdf>.
- Elkinton C, Blatiak A, Ameen H. 2014. Assessment of Ports for Offshore Wind Development in the United States. Document no. 700694-USPO-R-03. U.S. Department of Energy. San Diego (CA): Garrad Hassan America, Inc. [accessed 23 September 2024]. https://www.energy.gov/sites/prod/files/2014/04/f14/wind_offshore_port_readiness.pdf.
- [EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 April 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Maine Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_me.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 April 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 April 2024]. <https://livingatlas.arcgis.com/landcover/>.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

Friends of Sears Island. 2024. Sears Island History. [accessed 3 May 2024]. <https://friendsofsearsisland.org/about-fosi/>.

Google Earth Pro. 2024. Quonset/Davisville Port Modification Location. [accessed 2 May 2024].

Google Maps. 2024. 41°36'39.9"N 71°24'25.9"W. Street View. [accessed 29 April 2024].

Maine Department of Administrative and Financial Services. 2023 Aug 22. Revenues – June 2023. Augusta (ME): Department of Administrative and Financial Services. [accessed 6 May 2024]. <https://www.maine.gov/osc/sites/maine.gov.osc/files/inline-files/2023-06-Revenue%20Report.pdf>.

Maine Public. 2024. *Sears Island Selected As Preferred Site for Offshore Wind Power Port*. [published 20 February 2024; accessed 30 April 2024]. <https://www.mainepublic.org/2024-02-20/janet-mills-announces-sears-island-as-preferred-site-for-offshore-wind-power-port>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018a. Piping Plover and Least Tern Essential Habitat. [accessed 1 May 2024]. https://maine.hub.arcgis.com/datasets/584f6b86265042fd89edb2999834fd76_0/about.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018b. Roseate Tern Essential Habitat Layer. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/178b9154e0dc4294a8503ff65cd8606a/explore?location=43.880987%2C-69.088417%2C8.00>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018c. Seabird Nesting Islands. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/18042bb789b14f428a07a27ccd566319/explore?location=43.867664%2C-68.888028%2C7.74>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018d. Shorebird Areas. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/a259dcf5a25249bf833a2e6a2ef457cd/explore?location=43.990260%2C-68.843980%2C7.74>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018e. Special Concern Wildlife Habitat. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/14f07d843abb427a909380ba1db05e81/explore?location=45.016299%2C-69.000962%2C7.00>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018f. Tidal Waterfowl and Wading Bird Habitat. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/376e82589e1e472b9d9993ed09d20622/explore?location=44.032917%2C-68.918541%2C7.68>.

[MDMR] Maine Department of Marine Resources. 2018a. MaineDMR Aquaculture - AQ Leases. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/maps/maine::mainedmr-aquaculture-aq-leases/about>.

[MDMR] Maine Department of Marine Resources. 2018b. MaineDMR - Eelgrass. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/maps/maine::mainedmr-eelgrass/about>.

[MHPC] Maine Historic Preservation Commission. 2024. Cultural Architectural Resource Management Archive [CARMA] [database]. [accessed 2 May 2024]. <https://www.maine.gov/mhpc/quick-links/carma>.

Moffat & Nichol. 2021. *Maine Department of Transportation: Offshore Wind Port Infrastructure Feasibility Study, Concept Design Report*. Prepared for Maine Department of Transportation. Newton (MA): Moffat & Nichol. [accessed 8 May 2024]. https://penbay.org/searsisland/2021/windport_2021/si_2021_mdor_111721_windport_plan_94pgs.pdf.

Mosher JP, Spiess AE. 2023. A Nineteenth Century Commercial Fish Camp Site on Sears Island. *The Maine Archaeological Bulletin* 63(1):23–46.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 1 May 2024]. <https://www.mrlc.gov/data>.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

National Audubon Society. 2024. Important Bird Areas. [accessed 1 May 2024].
<https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2016. Nautical Chart No. 13309. 30th ed. [last correction 30 May 2023; accessed 21 Nov 2024]. <https://www.charts.noaa.gov/OnLineViewer/13309.shtml>.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 April 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 1 May 2024].
<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 1 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024].
<https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:::>

[NOAA] National Oceanic and Atmospheric Administration. 2023a. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 1 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. Maine and New Hampshire 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 30 May 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 1 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023d. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 1 May 2024].
<https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 April 2024].
<https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 April 2024].
<https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Penobscot Bay & River Pilots Association. 2024. Port of Searsport, Maine. [accessed 30 April 2024].
<https://www.penbaypilots.com/ports/port-of-searsport-maine/>.

Riess W, Daniel G. 1997. Evaluation of Preservation Efforts for the Revolutionary War Privateer *Defence*. *International Journal of Nautical Archaeology* 26:330–338.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

S&P Global. 2024. Ports & Terminals Guide. [accessed 30 April 2024]. S&P Global Maritime Portal.

Spieß AE, Hedden MH. 1983. *Kidder Point and Sears Island in Prehistory*. Occasional Publications in Maine Archaeology No. 3. Augusta (ME): Maine Historic Preservation Commission.

Sprague Energy. 2024. Searsport Maine Terminal Specifications. [accessed 2 May 2024]. <https://www.spragueenergy.com/terminals/searsport,-me>.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

Town of Searsport. 1859. Searsport Town Map. [accessed 2 May 2024]. [https://searsport.maine.gov/vertical/sites/%7B109E833E-7C03-47C1-9A66-DB12796F6D6C%7D/uploads/1859_Searsport_Town\(1\).pdf](https://searsport.maine.gov/vertical/sites/%7B109E833E-7C03-47C1-9A66-DB12796F6D6C%7D/uploads/1859_Searsport_Town(1).pdf)

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed April 2024]. https://data.census.gov/table/ACSDP5Y2022.DP03?q=DP03:%20SELECTED%20ECONOMIC%20CHARACTERISTICS&g=050XX00US23027_060XX00US2302766635.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed April 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed April 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 1 May 2024]. <https://fwprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 1 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 1 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 1902. Castine, Maine Quadrangle. 1:62,500 scale. [accessed 2 May 2024]. https://ngmdb.usgs.gov/ht-bin/tv_browse.pl?id=e321c323f3794c10ec94ce27819083de.

[USGS] U.S. Geological Survey. 1941. Castine, Maine Quadrangle. 1:62,500 scale. [accessed 2 May 2024]. https://prd-tnm.s3.amazonaws.com/StagedProducts/Maps/HistoricalTopo/PDF/ME/62500/ME_Castine_460299_1941_62500_geo.pdf.

SEARSPORT

Searsport, Maine – 4°26'35" N, 68°53'41" W

[USGS] U.S. Geological Survey. 1973. Searsport, Maine, Quadrangle. 1:24,000 scale. [accessed 2 May 2024]. <https://store.avenza.com/products/searsport-me-1973-24000-scale-united-states-geological-survey-map>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 1 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

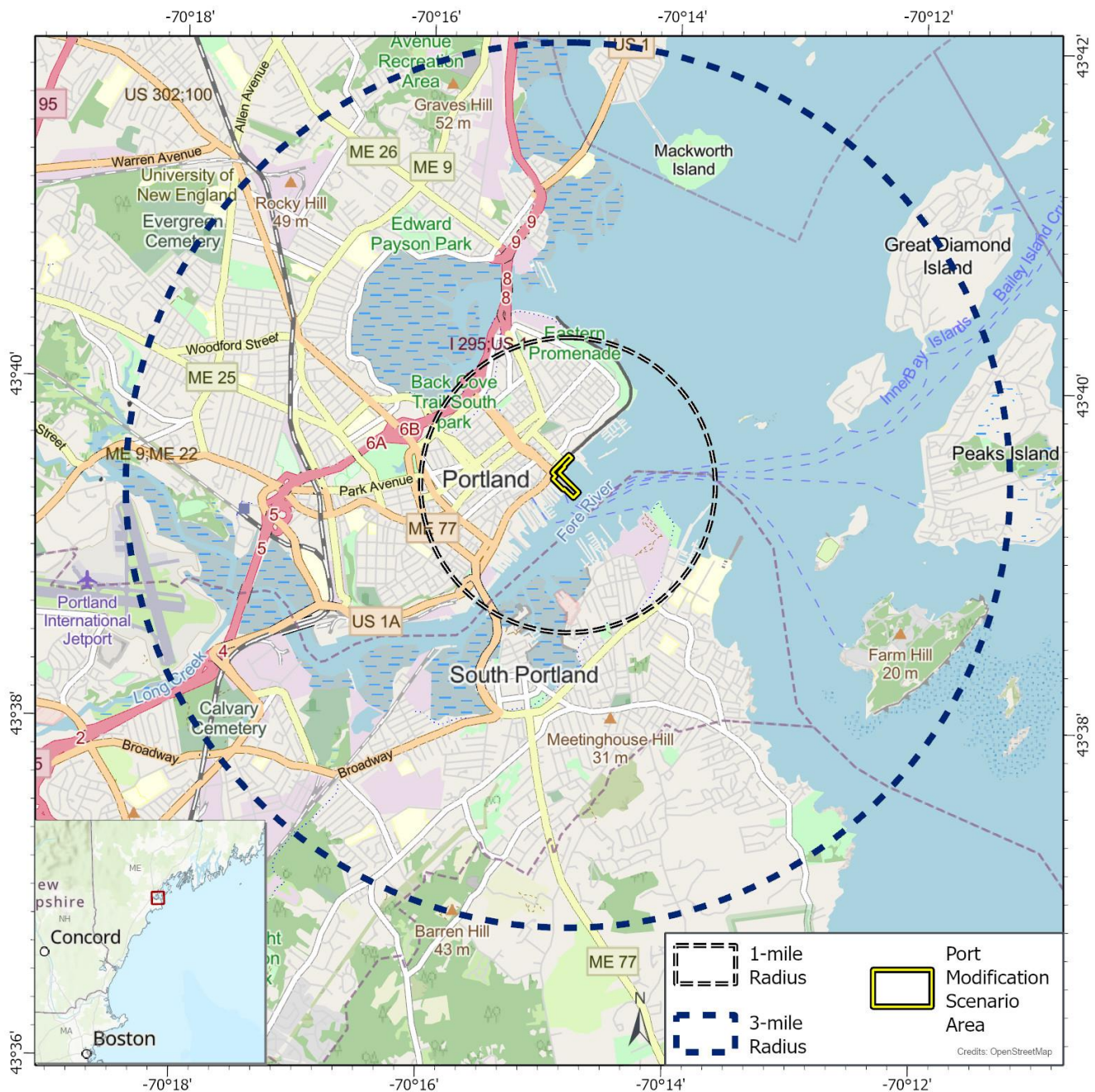
[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 1 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

PORTLAND PORT PROFILE

Maine State Pier and International Marine Terminal in Portland, Maine –
41°36'45" N, 71°24'19" W

Bureau of Ocean Energy Management
December 18, 2024



PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

1 Port Overview

Owner:	City of Portland (Maine State Pier) Maine Port Authority (International Marine Terminal)
Operator:	Maine Port Authority (Maine Port Authority 2024)
Primary Existing Uses:	Commercial shipping, cruise ships, and commercial fishing
Primary Existing Cargo:	Petroleum products, bulk cargo, breakbulk, and container goods (Maine Port Authority 2024)
Existing Port Employment:	Not provided by Maine Port Authority
Typical Operating Hours:	24 hours per day (Maine Port Authority 2024)
Terminal Land Area:	Approximately 7 acres (Maine State Pier) Approximately 9.75 acres (International Marine Terminal) (Maine Port Authority 2024)
Closest Wind Energy Lease Area:	Invenergy NE Offshore Wind LLC (OCS-A 0562)
Distance to Closest Lease Area:	Approximately 75 nautical miles
Potential Offshore Wind Port Uses:	Operations and maintenance (O&M) Crew transfer vessel (CTV) or service operation vessel (SOV) port

The Port of Portland, located in Portland, Maine, is a large, sheltered, deepwater harbor and is the Atlantic Ocean terminus for several petroleum pipelines that originate in Canada (S&P Global 2024). Based primarily on accessible area restrictions, Portland could be used for O&M operations or as a CTV or SOV home port. Portland includes two terminals that could be used to support offshore wind farms in those capacities, the International Marine Terminal (IMT) and the Maine State Pier (MSP). The Port of Portland is ice-free year-round (Maine Port Authority 2024) and has no air draft restrictions north (upstream) of the Casco Bay Bridge, which connects Portland with South Portland.

The MSP is a municipally owned marine facility that includes a concrete deck supported by wooden pilings. The berth associated with the MSP is approximately 1,000 feet long with a 35-foot depth, referenced to mean low water. The MSP has a quay bearing capacity of 500 pounds per square foot (psf). It recently has been used as music venue with a 3,000-person capacity; however, the venue is currently closed for renovations (City of Portland 2024a).

The IMT is located approximately 4,000 feet south of the MSP and is located just upstream of the Casco Bay Bridge. The IMT has 785 linear feet of wharf frontage and a 1,000-psf-capacity concrete deck (Maine Port Authority 2024). There is approximately 9.75 acres of upland, uncovered container storage area available and an additional 6 acres of developable land that has been targeted for cold storage (Maine Port Authority 2024). The IMT has a rail connection that includes an intermodal ramp for the loading of containers. The storage area can manage loads up to 67,000 pounds (container) and has two 124-metric-ton-capacity mobile cranes (Maine Port Authority 2024).

The port is accessed via a 1,000-foot-wide channel traveling from Casco Bay past South Portland and into the Portland Harbor Channel. Authorized depths for the channel are 45 feet in the outer reaches and 35 feet within the Portland Harbor Channel (National Oceanic and Atmospheric Administration [NOAA] 2018). Six additional terminals at the port are termini for petroleum pipelines, in addition to handling other petroleum-based cargo.

The conceptual layout for an O&M port is based on port requirements presented by Moffat & Nichol (2023) for an O&M port that would support floating offshore wind installations. The assumption for floating foundations is based on an assessment of existing conditions within the Gulf of Maine, as approximately 89% of the wind energy potential in the Gulf of Maine is in deep water (deeper than approximately 200 feet), which is considered “ideal” for floating wind turbine technology (DNV 2022). For a floating foundation O&M port, the approximate criteria for infrastructure are 5 to 10 acres of accessible area; a 300-linear-foot berth with a minimum draft of 20 to 30 feet; and a quay bearing capacity of 100 to 500 psf.

Existing capabilities are summarized in Table 1-1.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	1,000 (NOAA 2018)
	Port Access Channel Controlling Depth (feet)	35 (NOAA 2018)
	Overhead / Air Draft Restriction (feet)	Unlimited (north of Casco Bay Bridge) (NOAA 2018)
	Number of Berths	3 (City of Portland 2024b)
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	2.4 (MSP) (City of Portland 2024b) 4.9 (IMT) (Maine Port Authority 2024)
	Length (feet)	1000 (MSP) (City of Portland 2024b) 785 (IMT) (Maine Port Authority 2024)
	Depth (feet)	35 (MSP) (City of Portland 2024b) 32 (IMT) (Maine Port Authority 2024)
	Suitable for Spud-Jacking (Yes/No)	Not applicable for proposed use
	Approx. Size of Upland Storage/Staging Area (acres)	9.75 (IMT) (Maine Port Authority 2024)
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	n/a
Upland Storage	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	2 (IMT) (City of Portland 2024a)
	Roll-On/Roll-Off (Ro/Ro) Capability (Yes/No)	Yes (S&P Global 2024)
	Width of Ro/Ro Berth (feet)	48 (S&P Global 2024)
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	Not provided by Maine Port Authority
	Lifting Capacity (mt)	112 (x2) (Maine Port Authority 2024)
	Height Restrictions (Yes/No)	No
Cranes	On-Site Rail (Yes/No)	No (MSP) Yes (IMT)
	On-Site Highway (Yes/No)	No

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

There are no currently existing plans to develop a terminal to support offshore wind at the Port of Portland. Based on available land area and the proximity of the IMT and MSP to existing residential parcels, the Port of Portland could potentially support offshore wind development as an O&M port or as a base for crew transfer operations (CTV port) or general wind farm service activities (SOV port). The modifications required to develop the Port of Portland for these potential uses are based on CTV and SOV characteristics discussed in reports by Moffat & Nichol (2023) and the New York State Energy Research and Development Authority (NYSERDA) (2019).

CTVs are described as requiring up to 630 feet of wharf frontage with an available draft of up to 39 feet. CTVs can transport tools, small components (cargo payloads up to 5 tons), and up to 12 crew members (NYSERDA 2019). SOVs are described as vessels that “loiter and operate as in-field accommodations” for workers servicing wind farms (Moffat & Nichol 2023). SOVs are up to 400 feet in length and require available drafts up to 25 feet. Additional requirements for a port to house SOVs are access to quayside cranes and forklifts, an approximately 2.5-acre secure fenced-in upland site with ground bearing capacity of greater than 4,600 psf, office space, and links to local transport (Moffat & Nichol 2023).

Future modifications that may be required at the MSP to meet these requirements include providing a mobile crane, increasing the quayside bearing capacity, expansion and improvements to the ground bearing capacity of upland storage space, and modifications to existing access ways.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Specific modifications required to increase quayside bearing capacity and to provide a mobile crane potentially include driving new steel piles to support the wharf deck. MSP is currently supported on wooden piles. It is assumed that the wooden piles would be removed and replaced with steel piles. The steel piles would be connected via a steel sheet pile to form the bulkhead face. Because the wharf is pile-supported, ground bearing capacity modifications are likely to include the placement of fill and aggregates, which would be compacted using vibratory rollers, as well as the placement of surcharge loads, which would later be removed once compaction has occurred. The MSP is currently occupied by several buildings and additional parking areas. If the MSP were to be redeveloped for use to support offshore wind activities, these businesses would have to be permanently moved to other locations within the Portland waterfront.

Modifications required to develop and expand the available storage area at MSP include the conversion of an existing adjacent parking lot into an enclosed storage area capable of supporting a 4,600 psf load. The existing paving would be removed, and additional fill and aggregate would be imported and compacted in a manner similar to that discussed for the wharf. The available area that could be modified for use as storage is approximately 2.8 acres, which is slightly larger than the minimum requirement for SOV storage. Security fencing, gates, and lighting would also be installed around and within the storage area.

Modifications related to access improvements at MSP include increasing the ground bearing capacity to manage the required loads moving from the storage area to the wharf in a similar manner as described above for the storage area and wharf improvements. Also, similar to the storage area improvements, access way modifications would include the installation of security fencing, gates, and lighting.

The only modification required at the IMT to meet CTV or SOV port requirements is increasing the ground bearing capacity for the quayside and storage areas. Based on existing site characteristics, it is assumed that ground bearing capacity improvements would be accomplished via the placement of fill and aggregates, the placement of temporary surcharge loads to induce compaction, and additional compaction via vibratory rolling compactors. The IMT has existing security fencing and gates, which may require slight modifications to meet security requirements.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (i.e., CTV and SOV operations would increase emissions), an increase in local terrestrial cargo transportation related to OSW O&M activities, and associated worker activities (i.e., from new employees related to OSW).

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Cumberland County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Cumberland County, Maine, includes urban areas with a moderate population density and a sizable industrial base. Emission sources within the boundaries of Cumberland County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Cumberland County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Cumberland County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	131	26	10	3	–
Biogenics*	1,064	114	–	–	–	7,557	819	–
Dust	–	–	–	3,129	422	–	–	–
Fires	56	1	<1	6	5	13	3	806
Fuel Combustion	15,626	3,690	270	3,667	3,461	2,185	822	–

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Industrial Processes[§]	–	–	–	–	–	352	17	–
Miscellaneous[†]	3,308	99	32	750	685	2,185	340	–
Mobile	26,088	2,659	16	271	159	1,993	617	1,761,681
Point-Sources	1,210	997	275	95	72	443	97	1,015,179
Total	47,353	7,560	594	8,048	4,830	14,873	2,717	2,777,666

Source: EPA (2023).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Cumberland County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Cumberland County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Cumberland County reported an O₃ design value of 62.3 parts per billion (ppb) on average for the 2019 to 2021 period, 62.3 ppb on average for the 2020 to 2022 period, and 62.3 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vehicles and port machinery, as well as fugitive dust from earth-moving activities. During port modification activities, the emissions would originate from land-based mobile sources, as no marine activities occur during the construction phase. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and dumpers to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following assumptions:

- Construction would occur over 3 years.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 313 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.
- 5% of the total surface area under development would be disturbed daily.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	–	–	–	–	–	–	–	–
Nonroad Emissions	1.89	5.88	0.01	0.34	0.31	0.30	0.17	2,760.56
On-Road Emissions	0.20	0.01	<0.01	<0.01	0.03	0.01	<0.01	20.45
Fugitive Dust	–	–	–	–	1.16	0.12	–	–
Total	2.09	5.89	0.01	0.34	1.50	0.43	0.17	2,781.01

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Air emissions from construction would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long-term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day, 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.59	0.53	<0.01	0.02	0.01	0.01	–	197.35
Nonroad Emissions	0.04	0.17	<0.01	0.01	0.01	0.01	<0.01	82.68
On-Road Emissions	0.06	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	6.20
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06
Total	0.69	0.70	<0.01	0.03	0.03	0.02	<0.01	286.29

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening-level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the storage area bearing capacity improvement phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 10.96 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or O&M. These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The Portland modification scenario area falls within the City of Portland and includes myriad historic resources (Maine Historic Preservation Commission [MHPC] 2024; National Park Service [NPS] 2024). Review of the confidential MHPC Cultural Resources Information System (CARMA) database and publicly available reference sources identified 98 previously listed National Register of Historic Places (NRHP) cultural resource inventory points consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects within a 3-mile radius surrounding the modification scenario area (MHPC 2024; NPS 2024). These inventory points also include six National Historic Landmarks within the City of Portland (NPS 2024). Inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures recorded as cultural resources at the local, state, or federal levels (MHPC 2024; NPS 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structures of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area is situated on the MSP at the intersection of Commercial and Franklin Streets on the eastern waterfront of the City of Portland (Google Earth 2024). This pier was originally constructed on the site of the former Franklin Street Wharf, a former stop on the Underground Railroad in Portland and historically a hub of immigration into the United States (Historical Marker Database 2024; McCracken 2009). The MSP was constructed between 1921 and 1923 of creosoted southern pine piles and a concrete deck with a railway track running along the pier (Maine Memory Network 2024; McCracken 2009).

The modification scenario area contains multiple buildings and structures related to present-day activities at the pier, including the Portland-Little Diamond Island and Portland-Peaks Island Ferries and the Ocean Gateway Terminal for cruise ship traffic (City of Portland 2024b; Google Earth 2024; MHPC 2024; NPS 2024). Based on recent aerial imagery and maps, the area supports several industrial buildings, an outdoor entertainment venue, ferryboat access ways, a multistory parking structure, and deepwater docking facilities (City of Portland 2024b; Google Earth 2024). The modification scenario area is situated adjacent to commercial and residential areas of historic Portland with visual screening offered by buildings and additional wharves to the west, limited screening provided by trees and plantings along Commercial Street to the north, and limited screening to the east and south sides, which face Portland Harbor (Google Earth 2024). The potential modifications would add to the existing structures and industrial use of the port in a manner consistent with the existing character and activities of the port area.

Terrestrial Archaeological Resources: A group of 43 terrestrial archaeological sites, including 19 Pre-Contact, Contact, and Post-Contact period resources and 24 Historic period resources, are known to occur within 3 miles of the modification scenario area and are identified from confidential sources (MHPC 2024). All the Pre-Contact period sites were identified as camp sites in the CARMA database (Bourque 1995; MHPC 2024; NPS 2024; Salwen 1978; Spiess, personal communication). This 3-mile radius encompassed portions of Downtown Portland, South Portland, Deering, and Falmouth, Maine, and the Little Diamond, Great Diamond, Peaks, and Cushing Islands in Casco Bay (Google Earth 2024).

Within a 1-mile radius, 15 inventory points were historic archaeological sites; no Pre-Contact Native American sites were identified. Three of these archaeological resources are of undetermined NRHP status; one site is listed in the

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

NRHP (MHPC 2024; NPS 2024). This quantity of archaeological site data indicates an area of moderate to high frequency for archaeological resources. Older soils, retaining archaeological potential, could persist undisturbed by historic wharf construction or existing harbor developments near the MSP.

There is one National Register Archaeological District situated within the 3-mile radius in Casco Bay (MHPC 2024; NPS 2024). It is primarily a shell midden and documents the Pre-Contact habitation of the region (Bourque 2007; MHPC 2024).

Marine Archaeological Resources: As many as 18 shipwrecks are known to exist within a 1-mile radius in the City of Portland harbor from publicly available resources (NOAA 2024a). Two of these resources were identified by the CARMA database as underwater archaeological resources, one from the nineteenth century and one from the early twentieth century (MHPC 2024). These resources were of undetermined NRHP eligibility.

Aboveground Historic Resources: Within 3 miles of the modification scenario area, there are approximately 1,000 aboveground inventory points listed in the publicly available CARMA database (MHPC 2024). These include resources eligible for or listed in the NRHP, as well as aboveground resources ineligible for the NRHP or with undetermined status (MHPC 2024; NPS 2024). These inventory points are situated within the City of Portland, South Portland, Cape Elizabeth, Deering, and Falmouth, Maine. The historic resources consist of dwellings, structures, houses of worship, landscape elements, commercial or industrial buildings, and municipal facilities determined to be significant cultural resources at the local, state, or federal levels (MHPC 2024).

Approximately 700 documented cultural resource inventory points are located within a 1-mile radius and are identified in publicly available resources (MHPC 2024; NPS 2024). These resources are centered in Downtown Portland, South Portland, and the East End and consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists with undetermined, eligible, or listed status on the NRHP (MHPC 2024; NPS 2024). There are 14 National Historic Districts within 3 miles, eight of which are located within 1 mile of the MSP (MHPC 2024; NPS 2024). This quantity of historic property data indicates an area of high density for aboveground historic resources.

Cultural Resources Potential: Aerial imagery and historic topographic map review of a 1-mile radius surrounding the modification scenario area indicate the presence of multiple cultural resources and historic structures (Google Earth 2024; MHPC 2024). Many of these archaeological sites and historic areas, buildings, and structures relate to the emergence of Portland as an historic shipping center during the eighteenth century and as it persisted historically through the nineteenth and twentieth centuries (City of Portland 2024a).

Unknown terrestrial archaeological sites are of moderate to high potential in the proposed modification scenario area or surrounding areas and could also occur adjacent in more deeply buried terrestrial deposits or in undisturbed natural areas (intact shoreline sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Due to the extensive paving on the pier, port modifications would affect a limited amount of terrestrial soils or additional shoreline sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in shore sediments that are largely undisturbed by previous dredging, excavation, or erosion. Potential port modifications at MSP would affect a limited area of shoreline sediments with potential to retain buried archaeological sites during port development.

Multiple aboveground cultural resources were identified within a 1-mile radius and would be at risk of potential physical impacts from port modifications, including archaeological sites. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the port modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats 9,18,20	• Located within a developed high-density land use area (industrialized); surrounding medium- and low-density developed areas. • Open water and islands to the east with mixed use (medium density developed and forested). • Fore River drains into the harbor adjacent to modification scenario area; isolated wetlands within 1 mile. • Additional larger wetlands, streams, and rivers are found within 3 miles.
Shoreline Habitats ¹⁴	• Within the modification scenario area, manmade/ armored is the predominant shoreline category. • Within 1 mile, shorelines are predominately armored, with areas of gravel/sand beach. • Within 3 miles, shoreline transitions into more natural, vegetated banks, marsh, and saltmarsh habitats; islands exhibit natural wave cut and rocky shorelines.
Submerged Marine Habitats ^{7,8}	• Submerged Aquatic Vegetation patch mapped within 1 mile at the entrance to the harbor and surrounding the islands. • Suitable mussel habitat south of the port within 1 mile; additional larger areas of clam, mussel, oyster, and scallop habitat within 3 miles.
Designated Habitats/Places 10,11,12,13,15,16,17,21	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring; Bluefish; Northeast Skate Complex; Northeast Multispecies; Consolidated Highly Migratory Species; Atlantic Sea Scallops; Monkfish; Atlantic Salmon. • Habitat Areas of Particular Concern within 1 mile: Coastal Inlets, and Juvenile Cod. • No Critical Habitat, Biologically Important Areas (marine mammals), Important Bird Areas, or Coastal Barrier Resource Areas identified within 3 miles.
ESA Listed Species ^{12,19}	• Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. • Roseate terns: coastal islands within 1 mile. • Shortnose sturgeon, Atlantic sturgeon, and Atlantic salmon may occur within 1 mile. • Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles ^{5,19}	• Bald eagles, along with 41 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals ^{12,13,}	• Harbor porpoises and Atlantic bottlenose dolphins likely present near port.
State Specific Resources ^{1,2,3,4,5,6}	• State-listed birds: saltmarsh sparrow (1 mile); peregrine falcon, harlequin duck (3 miles). • Small areas of Tidal Waterfowl and Wading Bird Habitat within 1 mile to the south of the port, and larger areas within 3 miles associated with river drainage and floodplains. • Sea bird nesting islands within 3 miles. • Shorebird areas within 3 miles, associated with river drainage and floodplains.

Sources: ¹Maine Department of Inland Fisheries and Wildlife (MDIFW) 2018a; ²MDIFW 2018b; ³MDIFW 2018c; ⁴MDIFW 2018d; ⁵MDIFW 2018e; ⁶MDIFW 2018f; ⁷ Maine Department of Marine Resources (MDMR) 2018; ⁸MDMR 2019; ⁹ Multi-Resolution Land Characteristics Consortium 2021; ¹⁰National Audubon Society 2024; ¹¹NOAA 2021; ¹²NOAA 2022a; ¹³NOAA 2023a; ¹⁴NOAA 2023b; ¹⁵NOAA 2023c; ¹⁶NOAA 2023d; ¹⁷U.S. Fish and Wildlife Service (USFWS) 2023a; ¹⁸USFWS 2023b; ¹⁹USFWS 2024; ²⁰U.S. Geological Survey (USGS) 2022; ²¹USGS 2024.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

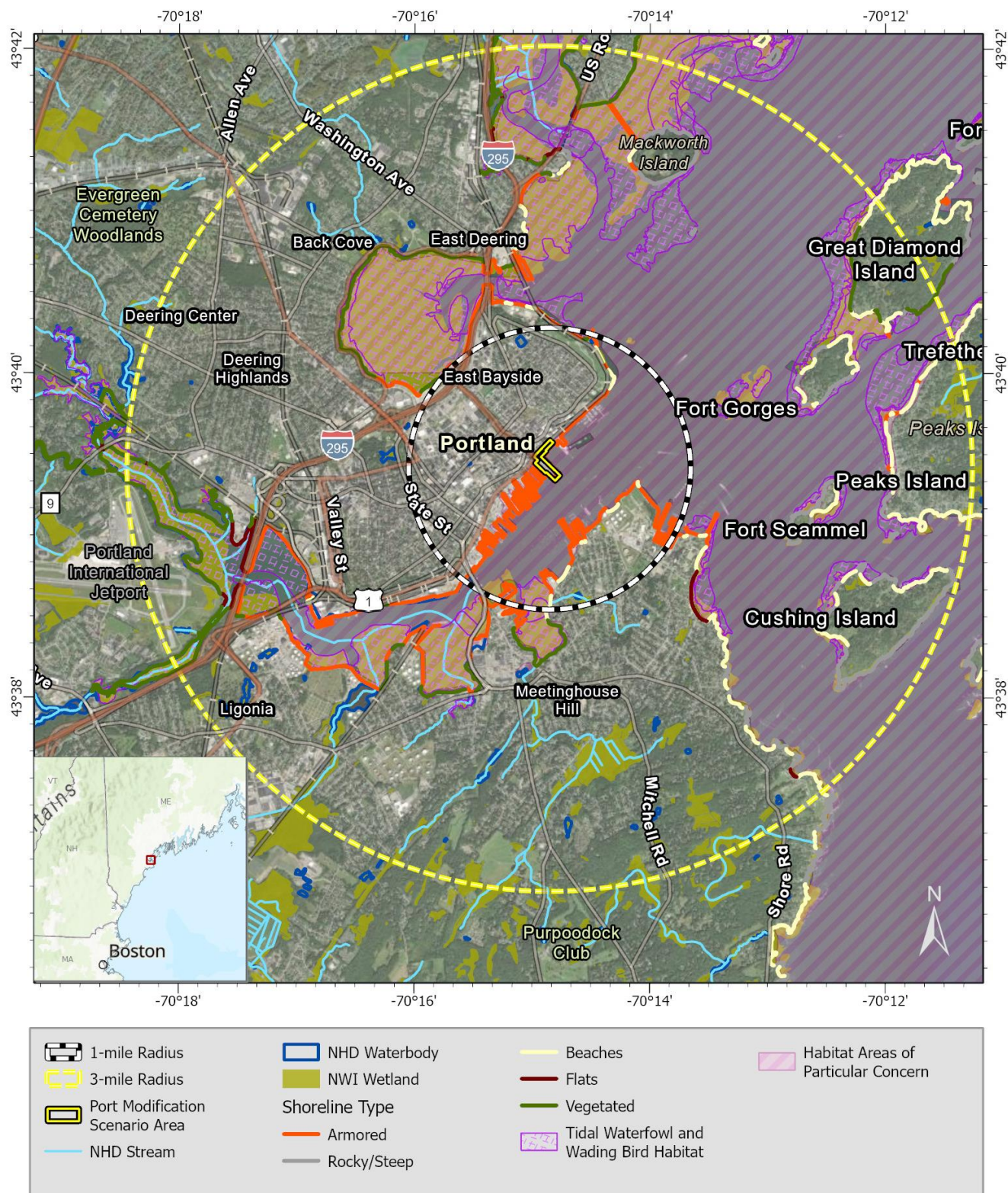


Figure 4-1. Existing habitats and natural resource areas.

Sources: MDIFW 2018e, 2018f; NOAA 2024b; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Sediment disturbance and temporary increase in turbidity for pile driving/drilling, and coffer dam dewatering activities associated with new berth.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	All onshore infrastructure and access improvements will be located over paved parking and access road areas. No anticipated impacts to terrestrial habitat.
Onshore Aquatic Habitats	None	All onshore infrastructure and access improvements will be located over paved parking and access road areas. No anticipated impacts to aquatic habitat.
Shoreline	Habitat alteration	Permanent alteration (improvement) of existing armored shoreline in modification scenario area.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	Permanent loss of marine habitat will occur due to potential replacement of existing piles and installation of additional support piles. This area is inclusive of Habitat Area of Particular Concern for juvenile cod, ubiquitous throughout the region.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and equipment interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to equipment interaction. Small non-ESA species within range of acoustic disturbances and equipment interaction.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to equipment interaction. ESA-listed species within range of acoustic disturbances and equipment interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, bald eagles, migratory birds, and other state protected species can occur within 1 mile and are at risk of temporary acoustic disturbances; however, minimal habitat exists to support these species. Acoustic impacts during operations would be consistent with existing land use.
Other Terrestrial Biota	Terrestrial noise	Temporary acoustic impacts to surrounding biota may occur; however, minimal habitat exists to support terrestrial biota within 1 mile. Acoustic impacts during operations would be consistent with existing land use.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Impact-causing elements of concern for potential adverse effects at the Port of Portland include noise from pile driving and other construction activities, visual changes due to tall cranes, and overlap of dredging and increased port calls with local maritime operations. These may disrupt commercial and recreational fishing, as well as ferry and cruise ship traffic. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

The presence of tall cranes may be viewed as degrading or improving visual resources depending on the opinion of the observer towards offshore wind development, the existing industrial development of shoreline areas, or general aesthetic preferences. Effective mitigating strategies for crane–related visual alterations may include:

- Meaningful public outreach that emphasizes community and environmental benefits of offshore wind.
- Painting to blend in with the surrounding viewscape.

Dredging activities and increased port calls may periodically disrupt heavy commercial maritime traffic, potentially impacting local ferry and cruise ship operations and permanently displacing some functionalities at an active commercial terminal. Mitigation strategies may include:

- Schedule dredging and port calls to avoid peak times for ferry and cruise operations, minimizing overlap and disruptions.
- Establish robust communication channels with all maritime stakeholders to provide advance notice of construction schedules and potential disruptions.
- Develop and implement traffic management plans that may involve rerouting vessels or adjusting docking times to accommodate peak traffic periods at commercial terminals.

Increased activity may disturb the daily operations of commercial and recreational fishing, including access to facilities. Noise and physical disturbances from dredging and construction activities may impact commercially fished stocks by disrupting fish behavior and habitat. Mitigation strategies may include:

- Coordinate with commercial and recreational fishing operators to adjust port operations and access, ensuring minimal interference with fishing activities.
- Implement strict scheduling for dredging and other noisy activities to occur during times that are least disruptive to fish behavior, based on the seasonal and daily patterns of local fish species.
- Use noise-reducing technologies and barriers to minimize underwater sound transmission from construction activities.
- Actively monitor fish populations and behavior to assess the impact of construction activities and adjust mitigation strategies as needed in real-time.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the modification scenario area is primarily mixed commercial and residential, with industrial uses immediately adjacent to the port (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	Portland International Jetport is approximately 5 miles away. Maine Central Railroad, Portland Terminal Railroad, B and M Railroad, and Maine Narrow Gauge Railroad are all within 5 miles of the port. I-295 is the nearest interstate and is less than 1 mile from the port, and I-95 is approximately 5 miles away. Other large highways within 5 miles of the port include US 1A, US 302, and SR 9, 22, 25, 26, 77, and 88 (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	Two military use areas are located within 5 miles of the port: the Portland International Jetport and the South Portland U.S. Coast Guard Station (Google Maps 2024; ArcGIS Online 2020).	Cranes interfering with airspace; increased maritime traffic.	The addition of cranes at the port could potentially interfere with airspace for the Portland International Jetport, requiring coordination with Federal Aviation Administration.
Visual	The port property and equipment are visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes 200–300 feet tall during construction; lights and vessel activity during operation.	Activities during construction and operation and new facilities would be adjacent to residential, cultural, and recreational areas. Tall cranes may be widely visible.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise would reach the adjacent residential, commercial, and recreational areas.
Air Quality	The EPA reports 1 of 6 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Diesel particulate matter is in the 54th percentile nationally. Asthma risk is in the 64th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 80th percentile nationally.	Project-related congestion.	Up to 20 additional personal vehicles per day. Without specific employment numbers available, the traffic impact cannot be precisely determined at this stage.
Maritime Navigation	The nearest marine highway is the Atlantic Deep Water Spine (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment. The impact during operation would be contingent upon the number of projects that utilize the port.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	The port manages a wide range of products, with annual cargo handling reaching approximately 22 million tons. The inventory includes petroleum products, paper, wood-pulp, scrap metal, coal, salt, and container goods (Seabay Logistics 2024). The port features nine commercial terminals and two passenger facilities, supporting both cargo and passenger operations (Maine Port Authority 2024). It recorded 348 cruise ship calls in 2023 (Cruisedata.info 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities.	Dredging activities and increased port calls may cause periodic disruptions to already heavy commercial maritime traffic, including impacts on local ferry and cruise ship operations and permanent displacement of existing functionalities at an active commercial terminal. While the sector has mechanisms to adjust the scheduling and routing of vessels to reduce congestion, these strategies may only partially mitigate the potential issues.
Commercial Fishing	Portland is a top 50 U.S. commercial fishing port, bringing in 9.8 million pounds and \$21.3 million in 2022 (NOAA 2022b). Engagement score for Portland: High (NOAA 2020). Reliance score for Portland: Low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The project overlaps with a major U.S. commercial fishing port, potentially disrupting harbor activities. Increased aquatic noise and physical disturbances from construction equipment could materially impact commercially fished stocks. Noise and physical interruptions are expected to decrease after construction has ended.
Recreational Fishing	There are several recreational deep-sea fishing charters in and out of Portland Harbor. There are numerous onshore recreational fishing locations within a mile of the modification scenario area, including wharves directly adjacent to the wharf to be modified. Engagement score for Portland: Low to Medium (NOAA 2020). Reliance score for Portland: Low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	There is significant recreational fishing activity in Portland Harbor. Increased activity in the harbor may disturb recreational fishing operations, including deep-sea charters and access to nearby wharves. Noise and physical disturbances are likely to temporarily affect fish behavior and availability, impacting the quality of recreational fishing experiences.
Recreational Resources	There are parks/protected areas, including city and state park land, municipal boat ramps, private and state conservation areas, and conservation easements, within 5 miles of the modification scenario area. Beaches are located north and south of the port (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters. Tall cranes would be visible from recreational areas. Increased port traffic could intermittently disrupt ferry services, potentially affecting access to recreational resources that depend on ferry connectivity.
Tourism	25,703 persons (8.5% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a). Casco Bay Ferry Terminal, Ocean Gateway Cruise Terminal, and the Portland Ocean Terminal immediately adjacent to modification scenario area (Google Maps 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Potential degradation of view and soundscapes. The modifications may interfere with the operations of the adjacent maritime facilities, potentially impacting ferry and cruise ship schedules and accessibility, thus affecting tourist experiences.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Housing and Lodging	2,100 of the 45,190 vacant housing units in the MSA are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers with relatively little conflict. Without specific employment numbers available, the housing and lodging impact cannot be determined at this stage.
Population	The population is 107,063 within 5 miles of the modification scenario area and is relatively moderate density. The population within the MSA is 555,691 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The 20 workers during construction would not materially increase MSA population. Without specific employment numbers available, the population impact cannot be determined at this stage.
Labor Force and Employment	The civilian labor force of the MSA is 309,183 and employment is 300,630. The unemployment rate is 2.8% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of 20 workers would not materially increase the labor force or decrease unemployment. Without specific employment numbers available, the labor force and employment impact cannot be determined at this stage.
Income Levels	The per-capita income is \$45,964 within 5 miles of the port and is \$49,611 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of 20 workers at prevailing wage levels would not materially alter income levels. Without specific employment numbers available, the impact on income levels cannot be determined at this stage.
Community Cohesion	The four nearest counties have community cohesion index percentiles of 17, 26, 24, and 33, indicating cohesion is below the national median (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Maine was \$6.5 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports seven hospitals and 30 schools are within 5 miles of the port. Nearly 25.1% of the MSA population is employed in "educational, health care, and social services" (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 April 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 30 April 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Bourque BJ. 1995. *Diversity and Complexity in Prehistoric Maritime Societies: A Gulf of Maine Perspective*. New York: Plenum Press.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://www.nature.com/articles/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- City of Portland. 2024a. Maine State Pier. [accessed 30 May 2024]. <https://www.portlandmaine.gov/1170/Maine-State-Pier>.
- City of Portland. 2024b. Three Berths. [accessed 30 May 2024]. <https://www.portlandmaine.gov/969/Three-Berths>.
- Cruisedata.info. 2024. Portland, Maine 2024 Cruise Ship Schedule and City Info. [accessed 11 June 2024]. <https://cruisedata.info/port-of-call/cruises-to-portland-maine>.
- DNV. 2022. *Socioeconomic Analysis of Offshore Wind in the Gulf of Maine*. Maine Governor’s Energy Office, Maine Offshore Wind Roadmap. [accessed 2 May 2024]. <https://www.maine.gov/energy/sites/maine.gov.energy/files/inline-files/Maine%20OSW%20DNV%20Socioeconomic%20Analysis%20of%20Offshore%20Wind%20in%20the%20Gulf%20of%20Maine%20Final%20Report.pdf>.
- [EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 April 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Maine Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 11 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_me.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 April 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 April 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 41°36'39.9"N 71°24'25.9"W. Street View. [accessed 29 April 2024]. <https://www.google.com/maps/place/41%C2%B036'39.9%22N+71%C2%B024'25.9%22W/@41.611075,-71.4097693,17z/data=!3m1!4b1!4m4!3m3!8m2!3d41.611075!4d-71.4071944?entry=ttu>.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Historical Marker Database. 2024. Franklin Street Wharf: Portland Freedom Trail. [accessed 28 May 2024]. <https://www.hmdb.org/m.asp?m=20614>.

Maine Memory Network. 2024. State Pier, Portland, ca. 1938. [accessed 28 May 2024]. <https://www.mainememory.net/record/71700>.

Maine Port Authority. 2024. Portland Terminals. [accessed May 2024]. <https://www.maineports.com/portland>.

McCracken C. 2009. Maine State Pier: A Look Back At Its History. *Munjoy Hill News*. [accessed 30 May 2024]. <https://munjoyhillnews.net/maine-state-pier-a-look-back-at-its-history/>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018a. Piping Plover and Least Tern Essential Habitat. [accessed 1 May 2024]. https://maine.hub.arcgis.com/datasets/584f6b86265042fd89edb2999834fd76_0/about.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018b. Roseate Tern Essential Habitat Layer. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/178b9154e0dc4294a8503ff65cd8606a/explore?location=43.880987%2C-69.088417%2C8.00>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018c. Seabird Nesting Islands. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/18042bb789b14f428a07a27ccd566319/explore?location=43.867664%2C-68.888028%2C7.74>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018d. Shorebird Areas. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/a259dcf5a25249bf833a2e6a2ef457cd/explore?location=43.990260%2C-68.843980%2C7.74>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018e. Special Concern Wildlife Habitat. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/14f07d843abb427a909380ba1db05e81/explore?location=45.016299%2C-69.000962%2C7.00>.

[MDIFW] Maine Department of Inland Fisheries and Wildlife. 2018f. Tidal Waterfowl and Wading Bird Habitat. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/datasets/376e82589e1e472b9d9993ed09d20622/explore?location=44.032917%2C-68.918541%2C7.68>.

[MDMR] Maine Department of Marine Resources. 2018. MaineDMR - Eelgrass. [accessed 1 May 2024]. <https://maine.hub.arcgis.com/maps/maine::mainedmr-eelgrass/about>.

[MDMR] Maine Department of Marine Resources. 2019. MaineDMR Molluscan Shellfish 2010. [accessed 1 May 2024]. https://maine.hub.arcgis.com/datasets/8bed34745343406d80c12b85d5e835c7_1/explore?location=43.661577%2C-70.236253%2C14.23.

[MHPC] Maine Historic Preservation Commission. 2024. Cultural Architectural Resource Management Archive [CARMA] [database]. [accessed 2 May 2024]. <https://www.maine.gov/mhpc/quick-links/carma>.

Moffat & Nichol. 2023. *State Land Commission's 2023 Alternative Port Assessment to Support Offshore Wind, Final Report*. Prepared for the California State Lands Commission. Newton (MA): Moffat & Nichol. [accessed 10 June 2024]. <https://slcprdwordpressstorage.blob.core.windows.net/wordpressdata/2023/02/Alternative-Port-Assessment-To-Support-Offshore-Wind-Final.pdf>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 April 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 April 2024]. <https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2018. Nautical Chart No. 13292. 42nd Edition. [updated 30 August 2023; accessed 10 June 2024]. <https://charts.noaa.gov/PDFs/13292.pdf>.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 April 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 April 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 April 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. [https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:::.](https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:::)

[NOAA] National Oceanic and Atmospheric Administration. 2023a. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 1 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. Maine and New Hampshire 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 30 May 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 1 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023d. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 1 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 April 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 April 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[NYSERDA] New York State Energy Research and Development Authority. 2019. 2018 Ports Assessment: Offshore Wind Operations and Maintenance Port Facilities. Final Report.

Salwen B. 1978. Indians of Southern New England and Long Island: Early Period. In *Northeast*, edited by BG Trigger, pp. 160–176. Handbook of North American Indians, Vol. 15. Smithsonian Institution, Washington, D.C.

Seabay Logistics. 2024. Port Codes – Port of Portland, ME (USPWM). [accessed 11 June 2024]. https://www.seabaycargo.com/seaport/detail/Portland-ME_USA_USPWM.html.

S&P Global. 2024. Ports & Terminals Guide. [accessed 30 April 2024]. S&P Global Maritime Portal.

Spieß A. Maine Historic Preservation Commission. Email conversation, 28 May 2024.

PORTLAND

Maine State Pier and International Marine Terminal in Portland, Maine – 41°36'45" N, 71°24'19" W

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed April 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed April 2024]. <https://data.census.gov/table/ACSDT1Y2022.B25004?t=Vacancy%20Characteristics>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed April 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for Maine. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed 7 June 2024]. <https://fred.stlouisfed.org/series/QTAXTOTALQTAXCAT3MENO>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 April 2024]. <https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 April 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 April 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 April 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 25 April 2024]. <https://doi.org/10.5066/P96WBCHS>.

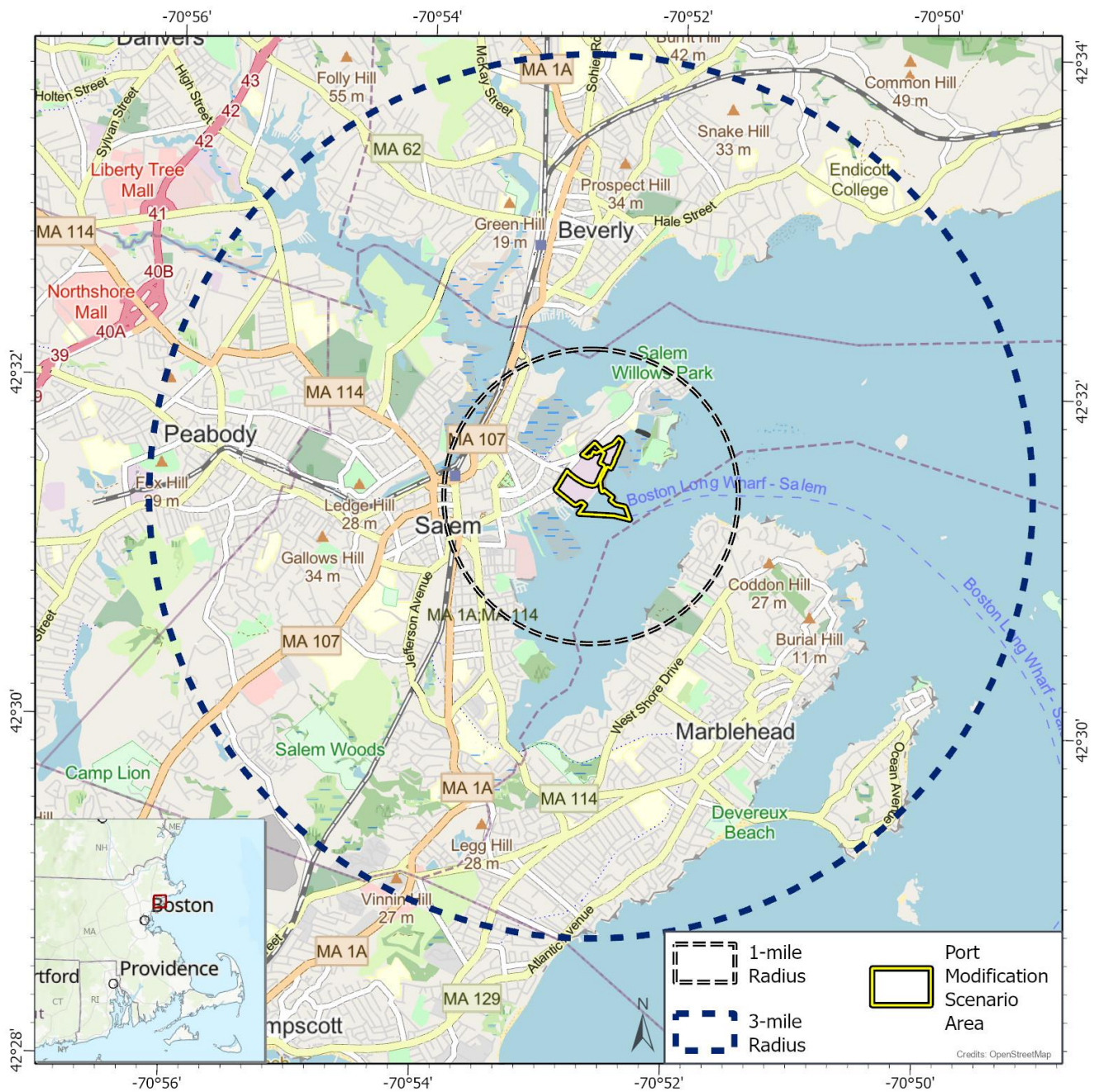
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

SALEM HARBOR PORT PROFILE

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Bureau of Ocean Energy Management

December 18, 2024



SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

1 Port Overview

Owner:	City of Salem (Commercial and Recreational Wharves, Ferry Terminal) Massachusetts Clean Energy Center (MassCEC) (Wind Terminal) (MassCEC 2024)
Operator:	Salem Harbor Port Authority (Commercial and Recreational Wharves) Crowley Wind Services (Wind Terminal) Boston Harbor Cruises (Ferry Terminal) (MassCEC 2024)
Primary Existing Uses:	Recreational vessels, light commercial fishing, cruise ships, fast ferry (Salem Harbor Port Authority 2024)
Primary Existing Cargo:	None (S&P Global 2024)
Existing Port Employment:	n/a (recreational and light commercial use only)
Typical Operating Hours:	n/a (recreational and light commercial use only)
Terminal Land Area:	Approximately 42 acres (Wind Terminal)
Closest Wind Energy Lease Area:	Avangrid Renewables, LLC (OCS-A 0564)
Distance to Closest Lease Area:	Approximately 67 miles
Potential Offshore Wind Port Uses:	Marshalling and assembly (fixed or floating foundations)

Note: n/a = not applicable.

The Port of Salem is located in Salem, Massachusetts. It is the second deepest port in the state of Massachusetts (Salem Harbor Port Authority 2024). Commercial uses at the port largely include light commercial fishing, recreational boating, visits from nearshore cruise vessels, and a fast ferry to Boston, operated by Boston Harbor Cruises (Salem Harbor Port Authority 2024; S&P Global 2024). A wind terminal is planned for construction beginning in 2024 and is expected to be completed in 2026 (Massachusetts Clean Energy Center [MassCEC] 2024). There are no existing commercial cargo operations at the port (S&P Global 2024).

The port of Salem is accessed from the northeast via a 32-foot deep federally maintained navigation channel (U.S. Army Corps of Engineers 2024) and a state-maintained turning basin, originally associated with a coal-fired power plant that formerly existed on the site where the wind terminal is being constructed. The inner harbor includes an 8-foot channel for recreational and light commercial vessels.

The proposed Salem Offshore Wind Terminal will be constructed on an approximately 42-acre portion of the site of the former Salem Harbor Power Station. The site formerly included a coal- and oil-fired power station, which was demolished in 2014 (Fort Point 2022). In 2017, a natural gas-fired power plant was constructed on a 65-acre portion of the overall site, which is still owned by the Salem Harbor Power Development LP and operated by Footprint Power, Inc. (Fort Point 2022). In 2022, Crowley Wind Services (Crowley) entered into an agreement with the City of Salem to purchase approximately 42 acres of property adjacent to the existing Footprint Power Station (Fort Point 2022). Crowley plans to develop an offshore wind marshalling terminal where turbine components will be partially assembled and delivered to offshore wind farms (Fort Point 2022). In 2024, the MassCEC, Crowley, and the City of Salem transferred the ownership of the property to MassCEC, with Crowley to maintain operational control of the terminal (MassCEC 2024).

The wind terminal property contains approximately 6,100 linear feet of waterfront, composed of a combination of steel bulkhead and riprap slope (Fort Point 2022). The waterfront contains an approximately 695-foot-long pile-supported wharf and a 60-foot-long pile-supported timber fishing pier. Adjacent to the site and wharf is an approximately 18-acre turning basin that has historically been maintained by the State of Massachusetts. The turning basin (at a depth of 32 feet, referenced to mean lower low water) is connected to a federal navigation channel (Fort Point 2022). The site also contains a riprap-lined discharge channel that was used for the discharge of cooling water from former power plant operations and is currently used for stormwater discharge (Fort Point 2022).

Existing capabilities are summarized in Table 1-1.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	300
	Port Access Channel Controlling Depth (feet)	32
	Overhead / Air Draft Restriction (feet)	Unlimited
	Number of Berths	1
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	n/a
	Length (feet)	6,100
	Depth (feet)	32
	Suitable for Spud-Jacking (Yes/No)	No
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	42
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	>14.6
	Haul Route Area Bearing Capacity (mt/m ²)	>14.6
	Approx. Size of Covered Storage Area (acres)	0.07
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	No
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	n/a
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	No
	On-Site Highway (Yes/No)	No

Source: Fort Point 2022.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for the Salem Wind Port is presented in the Expanded Environmental Notification Form (EENF), which was prepared by Fort Point on behalf of Crowley (Fort Point 2022). Construction of the wind terminal is began in 2024 (Commonwealth of Massachusetts 2024) and is anticipated to be completed in 2026 (Fort Point 2023). The wind terminal is planned for use for the marshalling and partial assembly of both fixed and floating foundation turbines. This report discusses modifications planned for fixed foundation offshore wind components, as described in the EENF (Fort Point 2022). Modifications related to floating foundations are expected to occur at a later date and may be assessed in a future report.

Planned modifications required to support offshore wind, as a fixed or floating foundation marshalling and assembly port include the following: ground bearing capacity improvements to two laydown yards; a transition yard that connects the two laydown yards; construction of a pre-assembly and loadout wharf, which would include roll-on/roll-off (Ro/Ro) ramp operations and a support area (that would be the site of a mobile crane); construction of a delivery wharf and connecting trestle; and dredging of the state turning basin and berths adjacent to the two proposed wharves (Fort Point 2023).

The two laydown yards will total approximately 29 acres and will be developed to store towers, nacelles, and blades for wind turbine construction. An approximately 2-acre transition yard will connect the two laydown areas. Modifications required to develop these areas include improvements to increase the ground bearing capacity via the excavation of existing surface soils and the filling and compaction of dense graded aggregate (Fort Point 2022). The target live load ground bearing capacities are 3,000 pounds per square foot (psf) for laydown yard “A,” located on the north side of the site, and 4,000 psf for laydown yard “B,” located on the south side of the site (Fort Point 2023). The transition yard will be developed to support a 48-ton-per-axle self-propelled modular transporter.

Modifications required for wharf construction include the demolition of existing structures, pile driving (for both the wharves and the heavy-lift area), fill placement for the main wharf, and the placement and compaction of dense graded aggregate on the decks of the two wharves (main wharf and delivery wharf) (Fort Point 2022). The portion of

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

the main wharf that will be used for assembly and loadout will be approximately 420 feet long with a target live load ground bearing capacity of 6,000 psf. The portion of the main wharf that will be used for Ro/Ro operations will be approximately 240 feet long with a target live load ground bearing capacity of 4,000 psf (Fort Point 2023).

Modifications required for berth improvements include dredging of the existing state-maintained turning basin to increase existing depths from 32 to 34 feet, referenced to mean lower low water. It is estimated that approximately 80,000 cubic yards of sediment would be dredged and disposed of offshore (Fort Point 2023).

Port modifications would also include minor accessway improvements within the modification scenario area, stormwater collection and management system improvements, lighting and other utilities. Landscaping improvements are also proposed to mitigate community visual impacts.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (i.e., the existing port is used primarily for recreational and light commercial use), an increase in local terrestrial cargo transportation (i.e., use of the wind terminal will include new sources of emissions from cargo operations), and associated worker activities associated with the new wind terminal.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Essex County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Essex County, Massachusetts, includes urban areas with a moderate population density and a sizable industrial base. Emission sources within the boundaries of Essex County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Essex County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from mobile sources and fuel combustion (from nonmobile sources). Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Essex County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	63	13	4	1	–
Biogenics*	529	82	–	–	–	6,147	445	–
Dust	–	–	–	2,447	372	–	–	–
Fires	119	2	1	13	11	28	7	1,871
Fuel combustion	4,444	1,720	26	613	605	603	210	–
Industrial processes§	–	–	–	101	13	33	<1	–
Miscellaneous†	1,396	35	10	679	623	4,834	693	–
Mobile	51,517	4,908	26	562	268	3,647	1,081	3,751,825
Point-Sources	701	2,638	204	113	105	365	34	1,876,367
Total	58,705	9,386	267	4,590	2,013	15,807	2,471	5,630,062

Source: EPA (2023).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. Although Essex County contains areas in which the air quality does not meet the National Ambient Air Quality Standards (NAAQS), the air quality within the county as a whole and in the city of Salem meets the NAAQS and is in

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Essex County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years. Ambient air quality monitors located in Essex County reported an O₃ design value of 62.3 parts per billion (ppb) on average for the 2019 to 2021 period, 64.0 ppb on average for the 2020 to 2022 period, and 67.0 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 360-horsepower (HP) barge-mounted mechanical dredge. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, HP rating, assumed load factor, fuel type, and the following assumptions:

- Construction would occur over 3 years.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	12.56	24.06	0.05	0.98	0.62	0.59	–	4,997.77
Nonroad Emissions	5.46	17.17	0.03	0.87	0.92	0.89	0.44	9,258.40
On-Road Emissions	25.60	1.87	0.02	0.33	3.83	0.94	0.09	2,632.67
Fugitive Dust	–	–	–	–	5.84	0.58	–	–
Total	43.62	43.10	0.10	2.18	11.21	2.00	0.53	16,888.84

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTPy = metric tons per year.

Air emissions from dredging expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.81	0.71	<0.01	0.03	0.01	0.01	–	269.76
Nonroad Emissions	0.30	0.81	<0.01	0.05	0.05	0.04	0.02	345.10
On-Road Emissions	0.76	0.01	<0.01	0.01	3.77	0.39	<0.01	79.16
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.13
Total	1.87	1.53	<0.01	0.09	3.83	0.44	0.02	691.15

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the pollutant of greatest concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 19.5 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from dredging during construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by potential port modifications consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials are made to the building, structure, or associated site features (e.g., on-site facilities or landscaping) occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of an historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affects integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features within the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers (SHPOs) and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Identified Cultural Resources: This port falls within the historic center of Salem, Massachusetts, and includes myriad historic resources. Review of the confidential and publicly available portions of the Massachusetts Cultural Resource Information System (MACRIS) database identified at least 4,400 previously documented cultural resource inventory points consisting of aboveground historic areas, buildings, structures, and objects and terrestrial archaeological sites within 3 miles of the port location within the City of Salem (Massachusetts Historical Commission [MHC] 2024; National Park Service [NPS] 2024). These inventory points consisted of aboveground historic areas, buildings, and structures and archaeological sites determined to be significant cultural resources at the local, state, or federal levels (MHC 1985, 2024; NPS 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those being considered for port developments in this setting. The modification scenario area was formerly the site of a power station and does not appear to contain buildings in available, recent aerial imagery street views or historic areas, buildings, or structures (Google Earth Pro 2024; MHC 2024). Based on aerial imagery, a battery of large fuel tanks (at the south end) and a previous power plant (at the northeast end) were removed from the modification scenario area between 2014 and 2017. These buildings and structures were replaced by the existing Footprint Power plant at Salem Harbor (center of the port area) in 2017, which uses natural gas turbine generators (Massachusetts Department of Environmental Protection 2021).

Terrestrial Archaeological Resources: Terrestrial archaeological sites of the Pre-Contact, Contact, and Post-Contact and Historic periods are known to occur within both 3 miles and 1 mile of the modification scenario area (Bragdon 1996; Eldridge and Vacaro 1952; MHC 1985, 2024; NPS 2024; Salwen 1978). Older soils may persist undisturbed by historic building construction and existing harbor developments.

Within 3 miles, 49 Native American archaeological sites from the Pre-Contact, Contact, and Post-Contact periods have been identified, encompassing portions of Salem, Marblehead, Beverly, Peabody, and Danvers, Massachusetts. This quantity of archaeological site data indicates an area of high frequency for archaeological resources. Within a 1-mile radius, there are 32 Pre-Contact, Contact, and Post-Contact archaeological sites; these sites include shell middens, lithic scatters, campsites, burials, and multicomponent sites such as the National Register of Historic Places (NRHP) listed Winter Island Historic and Archaeological District (Bragdon 1996; MHC 1985, 2024).

In addition, 28 historic Euro-American archaeological sites were identified within a 3-mile radius, encompassing portions of Salem, Marblehead, Beverly, Peabody, and Danvers, Massachusetts. Of these, 25 historic Euro-American archaeological sites and archaeological areas were identified within a 1-mile radius from the confidential MACRIS database (MHC 2024; NPS 2024). These sites consist of cemeteries, dwellings, commercial buildings, and military, agricultural, or transportation facilities and appear in the archaeological record starting in 1626 with the first European settlement of Salem (MHC 1985, 2024; NPS 2024).

Marine Archaeological Resources: Three submerged wrecks were identified within 3 miles of the modification scenario area; of these, 2 were within 1 mile (National Oceanic and Atmospheric Administration [NOAA] 2024a). These resources were of uncertain age and undetermined NRHP eligibility.

Aboveground Historic Resources: There are more than 4,400 historic inventory points and historic areas listed in publicly available databases within 3 miles of the modification scenario area; within 1 mile, there are more than 2,000 (MHC 2024). These inventory points consist of aboveground historic areas, buildings, structures, and objects determined to be significant cultural resources at the local, state, or federal levels (MHC 2024; NPS 2024). Of the aboveground inventory points within a 1-mile radius, 1,413 are listed as contributing elements within National Register Districts (MHC 2024; NPS 2024), of which there are at least 19 within the 1-mile radius. These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, foundries), and municipal facilities (schools, wharves, light stations, monuments). An additional 582 inventory points within 1 mile are of undetermined eligibility or not eligible for the NRHP (MHC 2024; NPS 2024).

There are nine National Historic Landmarks and one National Historic Landmark District within a 3-mile radius, including buildings found within the city of Salem and the adjacent town of Marblehead, Massachusetts (MHC 2024; NPS 2024). Of these, four National Historic Landmarks and the one National Historic Landmark District are located within a 1-mile radius. This total includes the House of Seven Gables, which is the closest National Historic Landmark District from the modification scenario area (MHC 2024; NPS 2024). The Salem Maritime National

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Historic Site, the first National Historic Site designation in the United States, is also situated within 1 mile of the modification scenario area (MHC 2024; NPS 2024).

The port is generally screened from historic buildings along Derby Street and Port Avenue, which border Salem Harbor, and from the shorelines of Winter Island by existing, mature tree lines, areas of fencing, and other landscaping. Buildings, structures, and historic areas to the interior of Salem are largely screened from the port by the buildings, structures, and trees on the roadways that border the port area.

Cultural Resources Potential: Aerial imagery and historic topographic map review of a 1-mile radius indicate the presence of multiple cultural resources and historic structures (Google Earth Pro 2024). Many of these historic archaeological sites, areas, buildings, and structures relate to the emergence of Salem as a global center for shipping during the eighteenth century and later as a manufacturing center in the nineteenth century (ACHP 2024). Individuals with historical ties to such historic sites in Salem, such as author Nathaniel Hawthorne, colonial merchant Elias Haskett Derby, and architect Samuel McIntyre, are notable for their contributions to American arts, culture, and industry (ACHP 2024).

Unknown terrestrial archaeological sites are of moderate potential in the modification scenario area or surrounding areas due to historic and modern ground disturbances but could occur adjacent in more deeply buried terrestrial and shoreline deposits or in undisturbed natural areas (intact shoreline sediments or under areas of fill). Terrestrial archaeological sites could occur at historical areas that have experienced redevelopment through time. Port modifications could affect terrestrial soils in adjacent areas as well as additional shoreline or harbor sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soils.

Marine archaeological wrecks were identified in the waters surrounding the port based on available confidential and publicly available sources (MHC 2024; NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in seafloor or shore sediments that are largely undisturbed by previous dredging, excavation, or coastal erosion. Port modifications could affect shoreline sediments and the seafloor during port development. These sediments could have potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the port. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{8,19,21}	• Located within an industrialized and active port, developed high-density land use area. • Open water to east, high density residential and urban area surround within 1 mile. • Isolated, mixed forest areas amid residential areas (medium density) within 3 miles. • Isolated forested wetlands, between 0.5 and 1.0 acre, within 1 mile. • Additional wetlands and streams are found within 3 miles.
Shoreline Habitats ¹⁵	• Within the modification scenario area, manmade/armored and riprap are the predominant shoreline category, with a small section of tidal flat along the northern shoreline of the area. • Other shoreline habitats within 1 mile include more natural habitats such as vegetated banks, mud/sand flats, sand and gravel beaches, and rocky/steep shores.
Submerged Marine Habitats ^{2,4,16,17}	• A small (~0.25 acre) patch of eelgrass occurs just west of the modification scenario area, and a larger eelgrass bed occurs along the shoreline opposite the port (Marblehead). • Waters to the north and south of the port, and within 1 mile, are identified as shellfish suitability areas.
Designated Habitats / Places ^{9,10,11,13,14,18,22}	• Critical Habitat for the North Atlantic right whale occurs within 3 miles of the port. • Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring; Bluefish; Northeast Skate Complex; Northeast Multispecies; Highly Migratory Species; Atlantic Sea Scallop; Surfclam and Ocean Quahog; Spiny Dogfish. • Habitat Area of Particular Concern (HAPC) for juvenile cod occurs within 1 mile. • Essex County Coastal Bird Islands and Marblehead Neck Important Bird Areas located within 3 miles; these are primarily coastal and offshore areas outside of the modification scenario area. • No Coastal Barrier Resource Areas or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{11,12,20}	• Northern long-eared and tricolored bats: habitat and flyways within 0.25 mile. • Roseate terns: habitats and flyways within 0.25 mile. • North Atlantic right whale and fin whales may occur within 1 mile. • Shortnose and Atlantic sturgeon may occur within 0.25 mile. • Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles ²⁰	• Bald eagles, along with 40 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals ¹⁴	• Harbor porpoises and Atlantic bottlenose dolphins likely present near port, in addition to Endangered Species Act (ESA)–protected species.
State Specific Resources ^{1,3,5,6,7}	• Estimate Habitats of Rare Wildlife and Priority Habitats of Rare Species within 3 miles, associated with Marblehead Harbor. • Natural Communities within 3 miles, along the coast and within Beverly Harbor. • Diadromous fish migratory habitat within 1 mile.

Sources: ¹Massachusetts Department of Conservation and Recreation 2009; ²[MDMF] Massachusetts Division of Marine Fisheries 2011; ³MDMF 2023a; ⁴MDMF 2023b; ⁵[MNHESP] Massachusetts Natural Heritage & Endangered Species Program 2021a; ⁶MNHESP 2021b; ⁷ MNHESP 2023; ⁸Multi-Resolution Land Characteristics Consortium 2021; ⁹National Audubon Society 2024; ¹⁰NOAA 2021; ¹¹NOAA 2022a; ¹²NOAA 2023a; ¹³NOAA 2023b; ¹⁴NOAA 2023c; ¹⁵NOAA 2024b; ¹⁶ [TNC] The Nature Conservancy 2010; ¹⁷TNC 2019; ¹⁸[USFWS] U.S. Fish and Wildlife Service. 2023a; ¹⁹USFWS 2023b; ²⁰USFWS 2024; ²¹[USGS] U.S. Geological Survey 2022; ²²USGS 2024.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

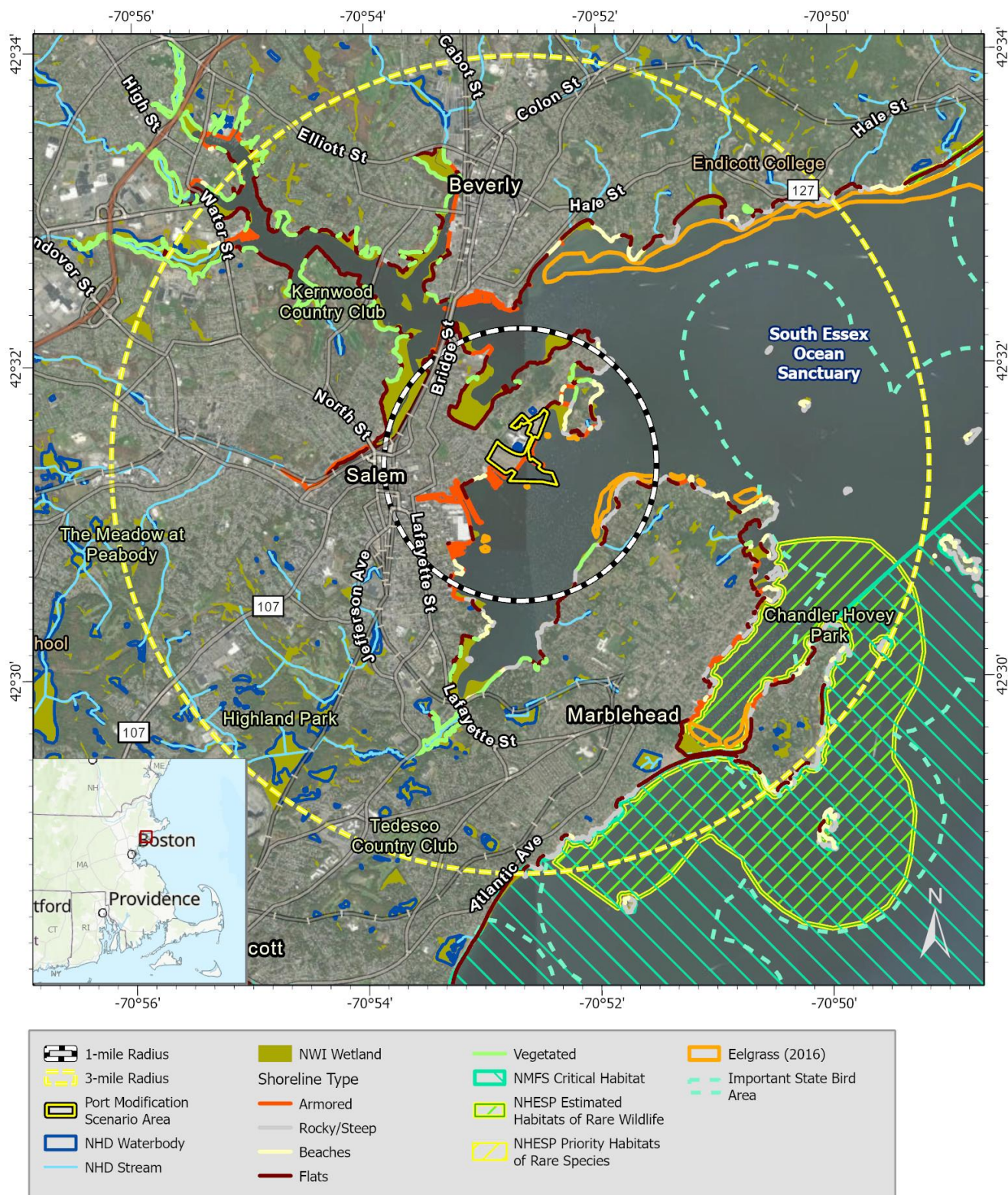


Figure 4-1. Existing habitats and natural resource areas.

Sources: MDMF 2023b; MNHESP 2021a, 2021b; National Audubon Society 2024; NOAA 2023b, 2024c; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition; dewatering	• Sediment disturbance and temporary increase in turbidity near area of dredging due to 21 acres of turning basin dredging. • Sediment disturbance and temporary increase in turbidity for fill placement and pile driving/drilling activities associated with new berth.
Sediment Quality	None	• No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	• No significant impacts to terrestrial habitats anticipated; the port is located in an existing cleared, former industrial area.
Onshore Aquatic Habitats	None	• No impacts to onshore aquatic habitats.
Shoreline	Sediment suspension and deposition	• Permanent loss of riprap within the modification scenario area is anticipated due to construction activities.
Submerged Marine Habitats / Benthic Resources	Aquatic habitat alteration	• Permanent loss of marine habitat will occur due to pile driving footprint and the placement of fill or armor stone for new berth construction. • Dredging activities (including maintenance dredging) required for port modifications will temporarily disrupt benthic habitats, resulting in injury and mortality within the benthic community and displacement of mobile organisms.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	• Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes. • Increased risk of injury or mortality due to vessel/equipment interaction. • ESA-listed species are within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	• Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes. • ESA-listed species are within range of acoustic disturbances. • Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	• Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes.
Birds and Bats	Terrestrial noise	• ESA-listed species, bald eagles, migratory birds, and other state protected species can occur within 1 mile and are at risk of temporary acoustic disturbances; however, minimal habitat exists to support these species. • Acoustic impacts during operations would be consistent with existing land use.
Other Terrestrial Biota	Terrestrial noise	• Temporary acoustic impacts to surrounding biota may occur; however, minimal habitat exists to support terrestrial biota within 1 mile. • Acoustic impacts during operations would be consistent with existing land use.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Impact-causing elements of concern for potential socioeconomic impacts included: pile driving–related noise during construction, visual alterations due to the presence of tall cranes during construction and operation, and the potential area overlap of dredging and operational port calls with Salem Ferry docking and navigation. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

The presence of tall cranes may be viewed as degrading or improving visual resources depending on the opinion of the observer towards offshore wind development, the existing industrial development of shoreline areas, or general aesthetic preferences. Effective mitigating strategies for crane–related visual alterations may include:

- Meaningful public outreach that emphasizes community and environmental benefits of offshore wind.
- Painting to blend in with the surrounding viewscape.

Potential overlap in the operating area of the Salem Ferry with dredging and new vessel activity has the potential to disrupt Salem Ferry service. Service disruptions could adversely affect existing commercial use of the port, general transportation, and tourism. Impacts could be mitigated by timing dredging activities and port calls, docking, and disembarking around existing Salem Ferry service times to the extent practicable.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the port is primarily mixed commercial and residential with interspersed forest cover; industrial uses immediately adjacent to the port (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries and adjacent vacant properties.	In the proposed port modification scenario, facilities would be within the existing port boundaries and adjacent vacant properties and would not affect surrounding land uses.
Infrastructure	The Beverly Regional Airport is located 4.5 miles north of the port. I-95 is the nearest interstate and is more than 5 miles from the port. Large highways within 5 miles of the port include Yankee Division Highway and MA 1, 107, and 114 (Google Maps 2024).	None – terrestrial port modifications will be contained within port boundaries and adjacent vacant properties.	In the proposed port modification scenario, facilities would be within the existing port boundaries and adjacent vacant properties and would not affect existing infrastructure.
Special Use Areas	None present (ArcGIS Online 2020).	None.	In the proposed port modification scenario, special use areas would not be affected.
Visual	The port property is directly visible from nearby residential and recreational areas adjacent to the port (Google Maps 2024).	Cranes up to 250 feet tall, land alterations during construction; lights and vessel activity during operation.	Activities during construction and operation and new facilities would be adjacent to residential, cultural, and recreational areas. Tall cranes may be widely visible.
Noise	Noise levels are moderate to high within 5 miles of the port, ranging from 45 decibels to 79.9 decibels. The highest noise is along a rail corridor. Other sources are located along highways and near airports (U.S. Department of Transportation [USDOT] 2024).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. During operation; general operational noise would reach the adjacent residential and recreational areas.
Air Quality	The EPA reports 3 of 6 air quality metrics within 5 miles of the port are below the 50th percentile nationally. Ozone, diesel particulate matter, and toxic releases to air are in the 89th, 68th, and 54th percentiles nationally, respectively. Asthma risk is in the 72nd percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity (daily traffic count at major roads divided by distance to road) within 5 miles of the port is in the 75th percentile nationally.	Project-related congestion.	Up to 200 additional personal vehicles per day during construction. During operation, the traffic associated with creation of up to 114 jobs would be added to a city that already employs almost 27,000.
Maritime Navigation	The nearest marine highway is the Atlantic Deep Water Spine (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The impact during operation would be contingent upon the number of projects that utilize the port.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	The port focuses on tourism and transportation. Local roads connect the port to I-95 (Salem Harbor Port Authority 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Dredging and port calls may interfere with Salem Ferry docking and routes.
Commercial Fishing	Salem is not a “Top US” commercial fishing port (NOAA 2022b). Engagement score for Salem: medium (NOAA 2020). Reliance score for Salem: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Project area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	The Salem Warf offers moorings for recreational fishing (Salem Harbor Port Authority 2024). Engagement score for Salem: medium (NOAA 2020). Reliance score for Salem: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with recreational ports/harbors. Material impacts to recreationally fished stocks not anticipated.
Recreational Resources	There are parks/protected areas, including city-owned land and the Salem Maritime National Historic Site, within 5 miles of the port. Beaches are located north of the port and south in Marblehead (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters. Tall cranes would be visible from recreational areas. Increased port traffic could increase traffic congestion at nearby recreational areas.
Tourism	34,832 persons (8.3% of employed persons) within the county are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Potential degradation of view and soundscapes. Potential impacts to operation of the Salem Ferry could reduce tourist access.
Housing and Lodging	3,274 of the 16,877 vacant housing units in the county are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 214,614 within 5 miles of the port and is relatively high density. The population within the county is 806,103 (USCB 2023c).	Potential in-migration associated with employment opportunities.	Up to 200 workers during construction would not materially increase county population. The creation of 114 new jobs could draw workers to the county; the effect would be immaterial to an 806,103-person population.
Labor Force and Employment	The civilian labor force of the county is 445,502 and employment is 421,898. The unemployment rate is 5.3% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A construction workforce of up to 200 workers would not materially increase the labor force or decrease unemployment. The creation of 114 operation jobs in a 421,898-person labor force with 5.3% unemployment would be immaterial.
Income Levels	The per-capita income is \$48,807 within 5 miles of the port and is \$50,932 within the county (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A construction workforce of up to 200 workers at prevailing wage levels, and the creation of 114 operation jobs in a 421,898-person labor force with 5.3% unemployment, would not materially alter income levels.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Community Cohesion	The three nearest counties have community cohesion index percentiles of 11, 12, and 17, indicating cohesion is below the national median (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues*	The 2024 total revenue for Massachusetts was \$56.6 billion (General Court of the Commonwealth of Massachusetts 2023).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports eight hospitals and 53 schools are within 5 miles of the port. Nearly 25% of the county population is employed in "educational, health care, and social services" (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

* Essex County does not have county-level government offices; citizens engage directly with a state or municipal government.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 April 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 30 April 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Bragdon K. 1996. *Native Peoples of Southern New England 1500-1650*. The Civilization of the American Indian Series. 1st edition. University of Oklahoma Press, Norman, Oklahoma.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Commonwealth of Massachusetts. 2024 Aug 15. Healey-Driscoll Administration, City of Salem and Crowley Celebrate Groundbreaking of Second Offshore Wind Terminal [press release]. [accessed 21 November 2024]. <https://www.mass.gov/news/healey-driscoll-administration-city-of-salem-and-crowley-celebrate-groundbreaking-of-second-offshore-wind-terminal>.
- Eldridge W, Vacaro J. 1952. The Bull Brook Site. *Bulletin of the Massachusetts Archaeological Society* 13(4). [accessed 8 May 2024]. <https://vc.bridgew.edu/bmas/>.
- [EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 April 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Massachusetts Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ma.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 April 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- [Fort Point] Fort Point Associates, Inc. 2022. *Expanded Environmental Notification Form - Salem Wind Port, Salem Massachusetts*. Prepared for Crowley Wind Services, Inc.
- [Fort Point] Fort Point Associates, Inc. 2023. *Single Environmental Impact Report - Salem Wind Port, Salem Massachusetts*. Prepared for Crowley Wind Services, Inc.
- General Court of the Commonwealth of Massachusetts. 2023. FY 2024 Final Budget. [accessed 8 May 2024]. <https://malegislature.gov/Budget/FY2024/FinalBudget>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 42°31'21.76"N, 70°52'40.23"W. Street View. [accessed May 2024].

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

Massachusetts Department of Conservation and Recreation. 2009. MassGIS Data: Areas of Critical Environmental Concern. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-areas-of-critical-environmental-concern>.

Massachusetts Department of Environmental Protection. 2021. Footprint Power Salem Harbor Fact Sheet. [accessed 10 May 2024]. <https://www.mass.gov/doc/salem-footprint-power-salem-harbor-january-2021/download>.

[MassCEC] Massachusetts Clean Energy Center. 2024 Feb 23. *MassCEC, City of Salem, and Crowley Announce Agreements for Salem Offshore Wind Terminal*. [accessed May 2024]. <https://www.masscec.com/press/masscec-city-salem-and-crowley-announce-agreements-salem-offshore-wind-terminal>.

[MDMF] Massachusetts Division of Marine Fisheries. 2011. MassGIS Data: Shellfish Suitability Areas. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-shellfish-suitability-areas>.

[MDMF] Massachusetts Division of Marine Fisheries. 2023a. MassGIS Data: Diadromous Fish. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-diadromous-fish>.

[MDMF] Massachusetts Division of Marine Fisheries. 2023b. MassGIS Data: Eelgrass Phase 6: 2019-2023. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-massdep-eelgrass-phase-6-2019-2023>.

[MHC] Massachusetts Historical Commission. 1985. MHC Reconnaissance Report: Salem. [accessed 7 May 2024] <https://www.sec.state.ma.us/mhc/mhcpdf/townreports/Essex/sal.pdf>.

[MHC] Massachusetts Historical Commission. 2024. Massachusetts Cultural Resource Information System [MACRIS] [online database]. [accessed May 2024]. <https://mhc-macris.net/>.

[MNHESP] Massachusetts Natural Heritage & Endangered Species Program. 2021a. MassGIS Data: NHESP Estimated Habitats of Rare Wildlife. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-nhesp-estimated-habitats-of-rare-wildlife>.

[MNHESP] Massachusetts Natural Heritage & Endangered Species Program. 2021b. MassGIS Data: NHESP Priority Habitats of Rare Species. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-nhesp-priority-habitats-of-rare-species>.

[MNHESP] Massachusetts Natural Heritage & Endangered Species Program. 2023. MassGIS Data: NHESP Natural Communities. [accessed 6 May 2024]. <https://www.mass.gov/info-details/massgis-data-nhesp-natural-communities>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 6 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 6 May 2024]. <https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 April 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. <https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:::>

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 April 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. Massachusetts and Rhode Island 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2024c. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 April 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Salem Harbor Port Authority. 2024. Port of Salem. [accessed May 2024]. <https://salemport.com/>.

Salwen B. 1978. Indians of Southern New England and Long Island: Early Period. In *Northeast*, edited by Bruce G. Trigger, pp. 160-176. *Handbook of North American Indians*, Vol. 15. Smithsonian Institution, Washington, D.C.

S&P Global. 2024. Ports & Terminals Guide. [accessed May 2024]. S&P Global Maritime Portal.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston (MA): Eastern Resource Office of The Nature Conservancy. [accessed 6 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 6 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

SALEM HARBOR

Salem Harbor in Salem, Massachusetts – 42°31'21.76"N, 70°52'40.23"W

U.S. Army Corps of Engineers. 2024. *Salem Harbor Navigation Project*. Accessed May 2024.

<https://www.nae.usace.army.mil/Missions/Civil-Works/Navigation/Massachusetts/Salem-Harbor/>

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed April 2024].

<https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed April 2024].

<https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed April 2024].

<https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 April 2024].

<https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 April 2024].

<https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 6 May 2024].

<https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 6 May 2024].

<https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 April 2024].

<https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 6 May 2024].

<https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 6 May 2024].

<https://doi.org/10.5066/P96WBCHS>.

Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024].

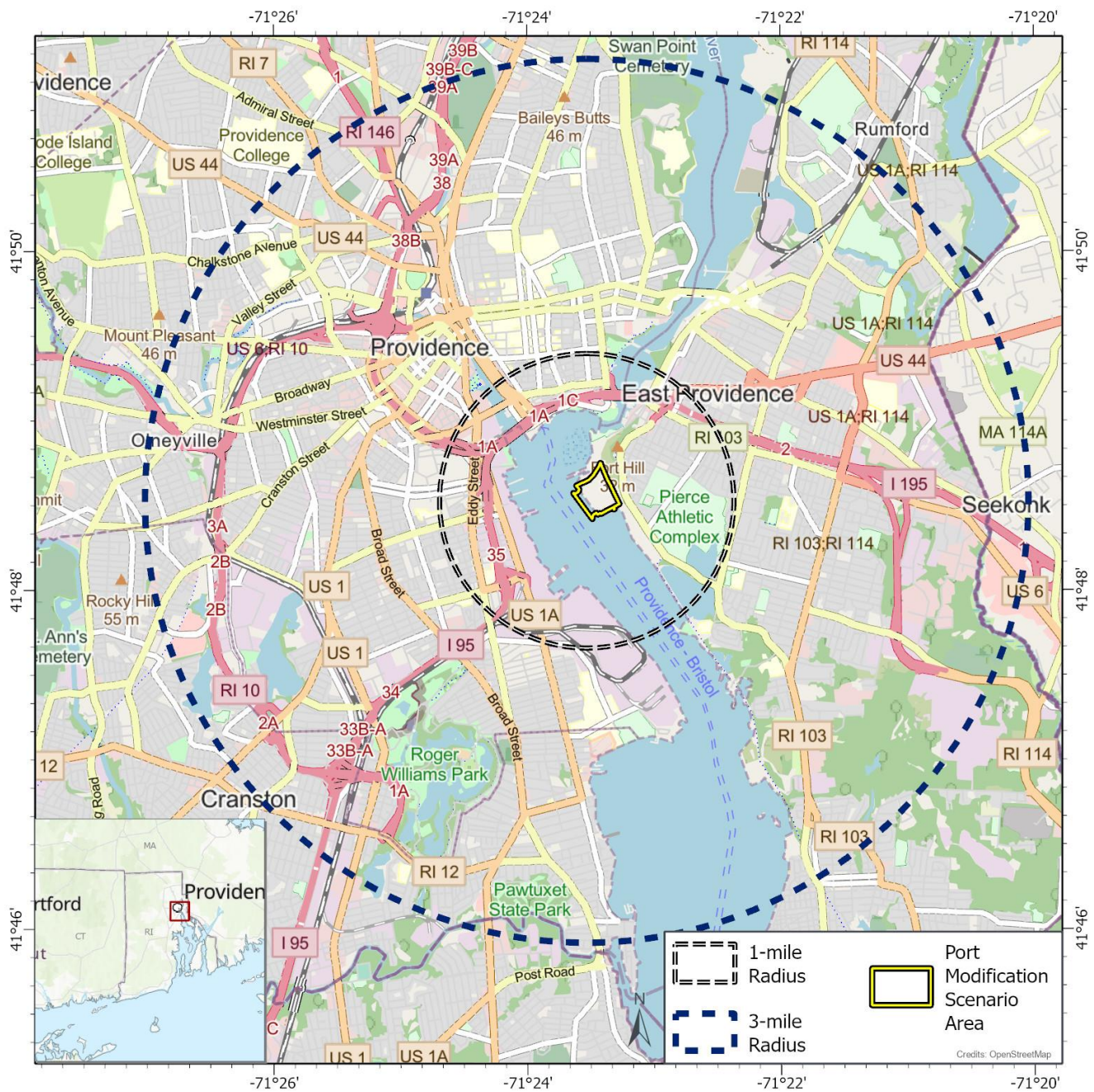
<https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

PROVIDENCE PORT PROFILE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Bureau of Ocean Energy Management

December 18, 2024



PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

1 Port Overview

Owner:	ProvPort, Inc. (ProvPort)
Operator:	Waterson Marine Terminal Services, LLC (ProvPort 2024a)
Primary Existing Uses:	Commercial shipping and cargo, wind energy (ProvPort 2024a)
Primary Existing Cargo:	Bulk cargo, petroleum products, break bulk, automobiles, and general cargo (ProvPort 2024a)
Existing Port Employment:	1,700 (4Ward Planning 2015)
Typical Operating Hours:	8:00 a.m. to 5 p.m. (ProvPort 2024b)
Terminal Land Area:	135+ acres (ProvPort 2024b)
Closest Wind Energy Lease Area:	Revolution Wind, LLC (OCS-A 0486)
Distance to Closest Lease Area:	Approximately 46 nautical miles
Potential Offshore Wind Port Uses:	Staging and assembly

The Port of Providence, Rhode Island, is one of only two deepwater ports in New England and is located at the convergence of Narragansett Bay and the Providence River (ProvPort 2024a). It is one of the busiest ports in the American northeast region, occupies over 135 acres and is capable of handling cargo operations for six vessels at any time (ProvPort 2024a). The port primarily manages bulk, break bulk, and other commercial cargos, including automobiles (ProvPort 2024a), with 4,200 linear feet of berthing and on-dock rail services. The port is located approximately 1 mile from Interstate Highway 95 (I-95) and is air draft limited by the Claiborne-Pell Bridge which spans Narragansett Bay and has an air clearance of 197 feet.

The Port of Providence is operated exclusively by Waterson Terminal Services, LLC (WTS) (ProvPort 2024a). WTS has responsibility for vessel scheduling, general management of the port, safety, capital improvements, and cargo transfer operations (ProvPort 2024a). The port is responsible for approximately 1,700 jobs and has an estimated total economic impact to the State of Rhode Island of \$211 million (4Ward Planning 2015).

In November 2023, ProvPort executed a lease deal with Rhode Island Waterfront Enterprises to develop and operate an approximately 30-acre undeveloped site in East Providence (ProvPort 2023). ProvPort is partnering with WTS and marine contractor SSA Marine to support port development (ProvPort 2023). The East Providence site was created in the 1940s, approved for maritime cargo use in 1978, and has since sat idle (East Providence Waterfront Commission 2021). The site is on the eastern side of the Providence River Fox Point Reach federal navigation channel (National Oceanic and Atmospheric Administration [NOAA] 2019) and is approximately 2,000 feet upstream of the existing Port of Providence campus.

The East Providence site buildout concept includes construction of a fully operational terminal for typical cargo operations and for use as an offshore wind development and support hub (East Providence Waterfront Commission 2021). The construction approach includes four phases, three of which are related to developing approximately 30 acres at the existing site. An additional future phase includes the development of an additional 50 acres of laydown area.

The East Providence site, referred to as the South Quay, is currently undeveloped, but is being used for dewatering dredged material from the Waterplace Park and Providence River Dredging Project (Rhode Island Coastal Resources Management Council [RICRMC] 2023). The dredging was completed in 2023, but recent (as of June 2024) aerial imagery via Google Earth indicates that dewatering activities may still be ongoing.

Existing capabilities are summarized in Table 1-1.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	600 (NOAA 2019)
	Port Access Channel Controlling Depth (feet)	40 (NOAA 2019)
	Overhead / Air Draft Restriction (feet)	197 (Claiborne Pell Bridge)
	Number of Berths	6
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	19.5
	Length (feet)	4,200
	Depth (feet)	40
	Suitable for Spud-Jacking (Yes/No)	Yes
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	20
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	n/a
	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	3
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	No (S&P Global 2024)
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	Up to 144
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	Yes

Source: ProvPort (2024b), unless otherwise noted.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for a proposed staging and assembly port (the South Quay Offshore Wind Facility) is presented in East Providence Waterfront Commission's 2021 presentation on the South Quay Marine Commerce Terminal - Future Multi-Modal and Offshore Wind Transportation Hub (East Providence Waterfront Commission 2021). The proposed South Quay terminal and wind facility (South Quay) project has obtained \$70 million in funding to construct the first phase of the project (ProvPort 2023). Phase 1 construction will include dredging, the construction of a steel bulkhead and coffer dams, a 550-foot dock, and 18 acres of high ground-bearing capacity storage and laydown areas (ProvPort 2023).

Phases 2 and 3 of the project, which have yet to be funded, include the expansion of the Phase 1 bulkhead, construction of a concrete platform, two wharves for inbound and outbound vessels, a small support dock, and expansions of the high ground-bearing capacity storage and laydown area (East Providence Waterfront Commission 2021). An additional future Phase 4 is also proposed, which would expand storage and laydown areas by approximately 50 acres. This report evaluates the first three phases of construction, which include all waterfront construction activities and would make the South Quay terminal fully operational.

Modifications required to prepare the upland portion of the site, covering approximately 28 acres, include clearing, grubbing, and grading to achieve a level ground surface. As noted under the existing conditions discussion, the South Quay is being used to dewater dredged material from a maintenance dredging project in the Providence River (RICRMC 2023). Any dewatered dredged material remaining on-site would likely require excavation and removal unless deemed appropriate for use. The conceptual design (East Providence Waterfront Commission 2021) proposes the import, dumping, and compaction of dense graded aggregate (DGA) to form a level, 4-foot-thick compacted layer that will be suitable for high ground-bearing capacity usage. Based on the area and proposed thickness of the DGA layer, it is estimated that approximately 180,000 cubic yards of DGA would be required for import, placement, and compaction.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Additional modifications in the upland storage and laydown area include the construction of drainage channels below the DGA layer to convey stormwater to a collection and management system, the installation of lighting and utilities, and the installation of fencing and gates for security (East Providence Waterfront Commission 2021).

On the waterside (west) side of the South Quay site, a concrete relieving platform is proposed, and outboard of the platform a steel bulkhead would be constructed. Modifications required for the construction of the concrete relieving platform include clearing and leveling the ground surface and importing, dumping and compacting a layer of DGA to form a base. A 4-foot-thick, reinforced concrete slab would then be constructed on-grade (i.e., no pilings or other foundation elements). The platform would extend 1,020 linear feet with a width of 50 feet and would cover approximately 1.2 acres along the shoreline (East Providence Waterfront Commission 2021).

Modifications required to construct the bulkhead include the driving of steel sheets along 1,020 linear feet of shoreline and the construction of fourteen 50-foot-diameter coffer cells and nine smaller 35-foot-diameter cells (East Providence Waterfront Commission 2021). Modifications specifically related to the coffer dams include the driving of steel support piles, installation of horizontal bracing elements, and driving of sheet piles to form the cells. Fill would be imported, dumped, and compacted within the cells, and between the cells to provide structural support.

Modifications required to construct the berths would include the driving of steel piles and the construction of the quay decks. The concept design documents that are available (East Providence Waterfront Commission 2021) do not specify the quay deck materials; however, for the purposes of this report, it is assumed that the quay decks would be constructed from reinforced concrete to provide adequate bearing capacity for loading and unloading activities.

Dredging would be required for vessels to access the inbound and outbound berths. Based on the adjacent federal navigation channel depth of 40 feet (NOAA 2019) and the area required for dredging, it is estimated that approximately 24,000 cubic yards of sediment (2.1 acres) would be removed. Based on the volume and area proposed for dredging, it is assumed that dredging would be conducted via mechanical means (e.g., crane and dredge bucket). Dredging activities would include dredged material dewatering, stabilization, processing and disposal, and water treatment. Because the upland portion of the South Quay site is likely to be under construction or complete during dredging, it is assumed that the dredged material would not be dewatered on-site as was done for the Waterfront Park and Providence River dredging project discussed previously.

An additional modification noted in the concept design documents (East Providence Waterfront Commission 2021) is the construction of a light-duty dock on the south side of the site for small support vessel use. Specific details are not included; however, based on the likely use, it is assumed that the dock could be constructed by driving wooden pilings with a wooden deck.

As noted, the port is air-draft restricted by the Claiborne-Pell Bridge, which would limit operations by reducing the available transport height unless some components are transported horizontally.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (e.g., the South Quay is currently not operational for vessel use, so there would be a significant increase in the use of the site), an increase in local terrestrial cargo transportation (e.g., via truck both on-site and on adjacent roads), and associated worker activities, including vehicle trips and parking.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Providence County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Providence County, Rhode Island, includes urban areas with a moderate population density and a sizable industrial base. Emission sources within the boundaries of Providence County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Providence County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with industrial facilities being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Providence County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	26	5	3	2	–
Biogenics*	440	58	–	–	–	6,423	372	–
Dust	–	–	–	3,060	452	–	–	–
Fires	61	2	1	8	6	14	3	123
Fuel Combustion	4,320	643	32	656	643	619	208	–
Industrial Processes§	–	–	–	–	–	69	3	–
Miscellaneous†	4,728	118	45	1,074	983	752	86	–
Mobile	31,482	4,077	15	436	213	2,019	592	2,651,051
Point-Sources	1,031	1,001	205	211	166	597	100	3,057,184
Total	42,062	5,899	298	5,471	2,468	10,496	1,366	5,708,358

Source: EPA (2023).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Providence County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Providence County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Providence County reported an O₃ design value of 57.0 parts per billion (ppb) on average for the 2019 to 2021 period, 57.7 ppb on average for the 2020 to 2022 period, and 62.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 40 days.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 12 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.16	3.74	0.01	0.16	0.10	0.09	–	706.41
Nonroad Emissions	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	25.60
On-Road Emissions	0.04	<0.01	<0.01	<0.01	0.11	0.01	<0.01	4.33
Fugitive Dust	–	–	–	–	1.02	0.10	–	–
Total	0.21	3.79	0.01	0.16	1.23	0.20	<0.01	736.34

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from dredging expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.59	0.54	<0.01	0.02	0.01	0.01	–	198.79
Nonroad Emissions	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	25.60
On-Road Emissions	0.11	<0.01	<0.01	<0.01	0.27	0.03	<0.01	11.77
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total	0.71	0.59	<0.01	0.02	0.28	0.04	<0.01	236.16

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 46.8 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from dredging during construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The Providence port modification scenario area falls within the City of East Providence, Rhode Island, which records 24 inventoried aboveground historic resources and 40 archaeological sites within confidential and publicly available reference sources (National Park Service [NPS] 2024; Rhode Island Historic Preservation and Heritage Commission [RIHPHC] 2024). The City of Providence also lies within the 3-mile radius examined and contains an additional 169 inventoried aboveground historic resources and 203 archaeological sites (NPS 2024; RIHPHC 2024). These resources include Native American Pre-Contact archaeological sites, archaeological sites associated with Historic period Euro-American settlement, structures associated with federally recognized and state-recognized historic districts, as well as individual historic structures (NPS 2024; RIHPHC 2024). The existing port buildings appear to be temporary structures and are not known to be historic, nor do they appear to be in available, recent aerial imagery street views (Google Earth 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those being considered for port developments in this setting.

The modification scenario area is a previously developed parcel situated to the south of the Wilkes Barre Pier along Veterans Memorial Parkway in the Fort Hill section of East Providence. The port area was developed in the 1940s and approved for maritime cargo use in 1978 (East Providence Waterfront Commission 2021); however, it is now largely a vacant lot serving as a dewatering area for dredged materials. It is adjacent to commercial and residential areas with visual screening provided by mature trees and vegetation along the west side of Veterans Memorial Parkway (Google Earth 2024). From the waterfront along the Providence River, the port faces the main Port of Providence on the west riverbank, which is also industrial in nature and visual character.

The historic city of East Providence was established by Roger Williams in 1636, the same year that the City of Providence was founded. East Providence contains four National Historic Districts and 19 listed NRHP resources, as well as the Crescent Park Carousel National Historic Landmark (NPS 2024; RIHPHC 2024). The City of Providence is situated to the north, across the Providence River and Providence Harbor, and is dense with historic and

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

archaeological resources. These dense resources include 33 National Historic Districts, 124 listed NRHP resources, and 13 National Historic Landmarks (NPS 2024; RIHPHC 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological sites are known to occur in the vicinity of the modification scenario area. Such sites are generally identified where older soils may persist undisturbed by historic and recent industrial and port developments either onshore, along the riverbed, or submerged near the shoreline. Statewide, there are nearly 1,900 Pre-Contact, Contact, and Post-Contact and more than 1,400 Historic period archaeological resources listed in the confidential RIHPHC archives accessed in person (RIHPHC 2024). Within a 3-mile radius, there are 17 Pre-Contact, Contact, and Post-Contact and nine Historic archaeological resources, including one National Historic Archaeological District listed in state and federal inventories (Cathcart and Olson 2018; NPS 2024; RIHPHC 2024). This 3-mile radius encompassed East Providence, the City of Providence and neighborhoods including Fox Point, College Hill, Wayland, Federal Hill, West End, Upper South Providence, and Lower South Providence (Google Earth 2024).

Fourteen archaeological resources were identified within a 1-mile radius, including six Pre-Contact lithic scatters and camp sites and six Historic period archaeological resources consisting of middens and domestic sites. Two additional archaeological sites were identified within 1 mile, a multicomponent Native American and Historic site, and an undated Native American habitation site with midden and burial—previously destroyed (RIHPHC 2024).

Marine Archaeological Resources: Six submerged wrecks were identified within a 3-mile radius in publicly available resources. Of these, five were identified within 1 mile (NOAA 2024a). These resources were of uncertain age and undetermined NRHP eligibility.

Aboveground Historic Resources: Within 3 miles, there are approximately 50 aboveground inventory points listed in the RIHPHC publicly available archives, which were accessed in person (RIHPHC 2024). These include resources that are eligible for or listed on the NRHP, as well as aboveground resources not eligible for the NRHP or with undetermined status (NPS 2024; RIHPHC 2024). The inventory points extend into the City of Providence and neighborhoods including Fox Point, College Hill, Wayland, Federal Hill, West End, Upper South Providence, and Lower South Providence (Google Earth 2024). The resources consist of dwellings, structures, houses of worship, landscape elements, commercial or industrial buildings, and municipal facilities determined to be significant cultural resources at the local, state, or federal levels (NPS 2024; RIHPHC 2024).

Within 1 mile of the modification scenario area there are two aboveground inventoried National Historic Districts and 13 individually listed NRHP resources consisting of buildings and structures (NPS 2024; RIHPHC 2024). The quantity of historic property data across the 3-mile and 1-mile study areas indicates a high density of aboveground resources, particularly in the City of Providence (NPS 2024; RIHPHC 2024).

Cultural Resource Potential: Historic map reviews within the modification scenario area and the study areas indicate the presence of multiple cultural resources and historic structures (Google Earth 2024; NPS 2024; RIHPHC 2024). These areas, structures, and buildings were related to the emergence of Providence as an historic shipping center during the eighteenth, nineteenth, and twentieth centuries (City of East Providence 2024; Providence and Warwick Convention and Visitors Bureau 2024).

Unknown terrestrial archaeological sites are of low potential in the immediate modification scenario area or surrounding areas but could occur adjacent in more deeply buried terrestrial deposits, or in undisturbed natural areas (intact riverbank sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Port modifications could affect terrestrial soils as well as additional riverbank sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in riverine or harbor sediments that are largely undisturbed by previous dredging, excavation, or erosion. Port modifications could affect riverbank sediments that may be of potential to retain buried archaeological sites.

Multiple aboveground cultural resources were identified within the 1-mile modification scenario area and would be at risk of potential physical impacts from port modifications. Aboveground historic areas, buildings, and structures

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the port modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,14,16}	- Modification scenario area is located within a developed high-density land use area (industrialized); and high density (urban) residential housing, decreasing in intensity at approximately 2 miles. - Open water to west, and mixed forest systems to the south and east at 2 to 3 miles. - Current land use in modification scenario area is low quality vegetated and industrial areas. Imagery indicates approximately 4 acres of pond and 2 acres of herbaceous wetlands within modification scenario area have been filled. - Seekonk River and Woonasquatucket River drain into the Providence River, within 1 mile north, and a few small, isolated wetlands occur within 1 mile. - Additional wetlands and larger streams are found within 3 miles. - Approximately 100 acres of local parks and public access areas within 1 mile.
Shoreline Habitats ⁸	- Within the modification scenario area, manmade/armored and riprap are the predominant shoreline category, with small pockets of gravel sand beaches. - The majority of the shoreline within 1 mile is armored, consisting of seawall and riprap with some natural rocky shorelines - Isolated brackish marshes occur in smaller sheltered areas at increasing distance from the modification scenario area.
Submerged Marine Habitats ^{10,12}	- Modification scenario area is in a Prohibited Shellfishing zone. - No submerged aquatic vegetation (SAV) identified within 3 miles.
Designated Habitats / Places ^{2,3,5,6,7,11,13,17}	- Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies; Consolidated Highly Migratory Species. - Habitat Areas of Particular Concern (HAPCs) for Summer Flounder SAV, and Juvenile Cod within 1 mile. - No Important Bird Areas, Critical Habitat, Biologically Important Areas (marine mammals), or Coastal Barrier Resource Areas identified within 3 miles.
ESA Listed Species ^{4,15}	- Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. - Roseate terns: coastal habitats within 1 mile. - Shortnose and Atlantic sturgeon may occur within 1 mile.
Migratory Birds and Eagles ^{9,15}	Bald eagles, along with 29 species of migratory birds (some with state protections) have suitable habitat within 1 mile.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Resource Category	Existing Conditions
Marine Mammals ⁷	Harbor porpoises and Atlantic bottlenose dolphins likely present near modification scenario area.
State Specific Resources ^{9,10,11}	- Natural Heritage Areas (NHA) 8 and 62 are located to the north and south. - Additional NHAs within 3 miles.

Sources: ¹ Multi-Resolution Land Characteristics Consortium 2021; ² National Audubon Society 2024; ³ NOAA 2021; ⁴ NOAA 2022a; ⁵ NOAA 2023a; ⁶ NOAA 2023b; ⁷ NOAA 2023c; ⁸ NOAA 2024b; ⁹ Rhode Island Department of Environmental Management (RIDEM) 2023a; ¹⁰ RIDEM 2023b; ¹¹ RIDEM 2024; ¹² University of Rhode Island Environmental Data Center 2024; ¹³ U.S. Fish and Wildlife Services 2023a; ¹⁴ USFWS 2023b; ¹⁵ USFWS 2024; ¹⁶ U.S. Geological Survey (USGS) 2022; ¹⁷ USGS 2024.

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Sediment disturbance and temporary increase in turbidity from dredging, pile driving/drilling, and coffer dam dewatering.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of ~30 acres of low-quality vegetated area/industrial use area due to clearing for fill excavation, infrastructure/laydown areas, and roads.
Onshore Aquatic Habitats	Aquatic habitat alteration	Possible permanent loss of ~2 acres of herbaceous wetlands and a 4-acre pond for onshore infrastructure and access, although this habitat is likely already cleared and filled based on imagery.
Shoreline	Sediment suspensions; habitat alteration	Permanent loss of riprap shoreline within the modification scenario area; however, this shoreline type is fairly ubiquitous and is low quality habitat along the riverbanks.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alternation	Permanent loss of ~3.7 acres of benthic habitat and resources due to berth and coffer dam construction, and temporary loss of approximately 2 acres due to dredging for berth access. This area is inclusive of HAPC for juvenile cod and summer flounder, ubiquitous throughout the region.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation. Temporary acoustic impacts due to pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances. Acoustic impacts during operations would be consistent with existing land use within 1 mile.
Other Terrestrial Biota	Terrestrial noise	Impacts due to construction and operations noise may occur within an NHA in the northeastern corner of the modification scenario area. Acoustic impacts during operations would be consistent with existing land use within 1 mile.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, “Port Overview.”

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

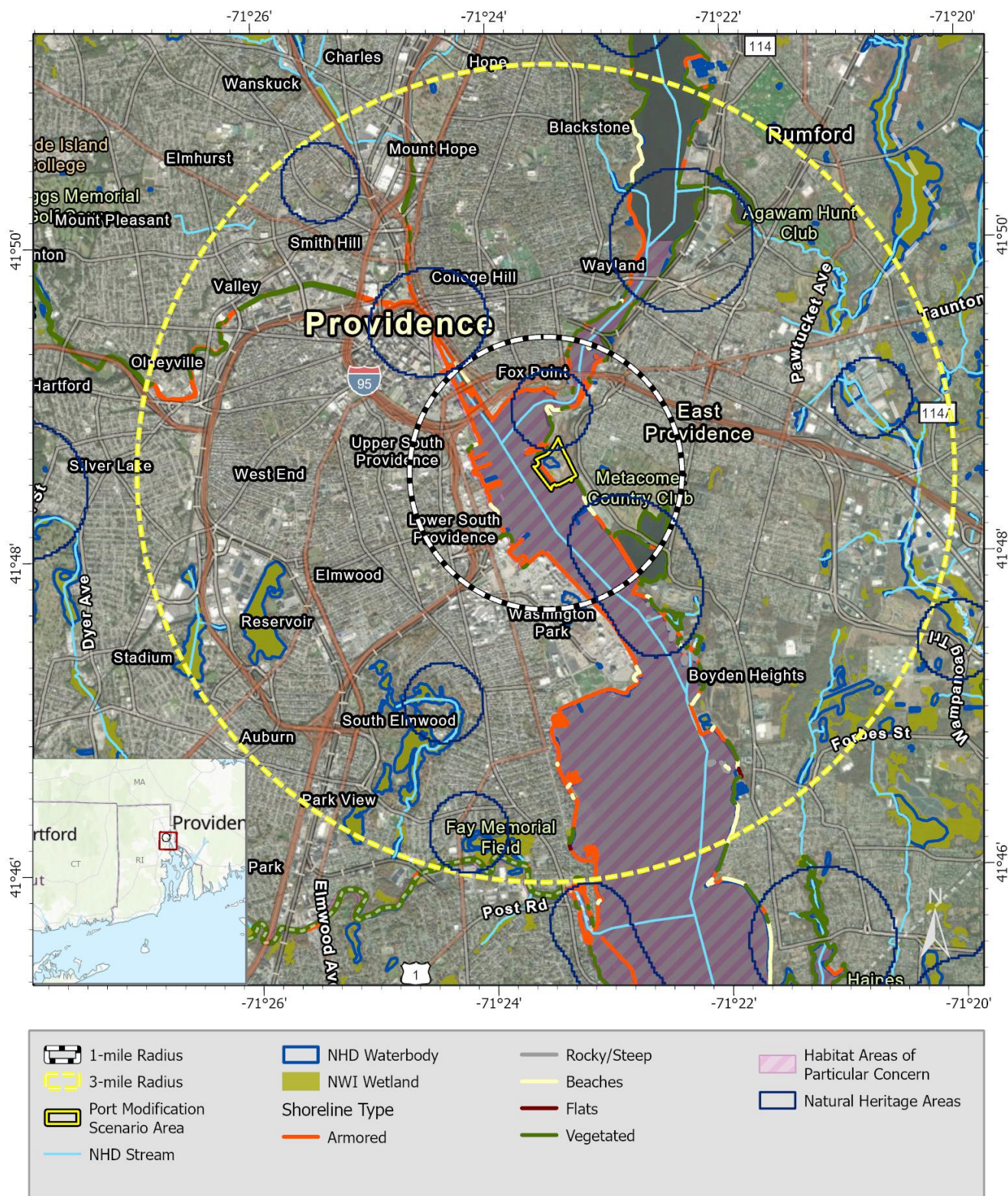


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2021, 2024c; RIDEM 2024; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern for potential adverse socioeconomic impacts. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Within 5 miles of the port, land use predominantly consists of urban commercial and residential areas, bordered by cleared industrial land directly adjacent to the port. The vicinity also features parks, schools, and natural areas (Esri 2023).	None – terrestrial port modifications will be contained within cleared, industrial port boundaries.	In the proposed port modification scenario, facilities would be contained within cleared, industrial port boundaries and would not affect surrounding land uses.
Infrastructure	The nearest airport is the Rhode Island T.F. Green International Airport and is just over 5 miles away from the port. I-195 is the nearest interstate and is less than 1 mile from the port, and I-95 is approximately 3 miles away. Other large highways within 5 miles of the port include US 1, US 44, US 6 and RI 114, RI 10, and RI 126. The New York, New Haven, and Hartford Railroad and the Mov Railroad are within 5 miles of the port (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	There are no active military use areas within 5 miles of the port. However, the shipping lanes used by the port include routes near the Newport Naval Station and Naval use areas on Gould Island, Rhode Island (ArcGIS Online 2020).	Increased maritime traffic.	Any potential maritime congestion issues during construction and operation can be mitigated by shifting timing and location of port calls over the long run.
Visual	The port property and equipment are not generally visible from nearby residential and recreational areas due to intervening landscape (Google Maps 2024).	Cranes 60–300 feet tall during construction; cranes up to 200 feet, lights and vessel activity during operation.	Port location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport, just over 5 miles away. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise would reach nearby residential, commercial, and recreational areas.
Air Quality	The EPA reports 3 of 6 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Ozone, Diesel Particulate Matter, and Toxic Releases to Air are in the 57th, 64th, and 67th percentile nationally, respectively. Asthma risk is in the 95th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 90th percentile nationally.	Project-related congestion.	Up to 170 additional personal vehicles per day during construction. During operation, the traffic associated with creation of dozens of jobs would be added to a city that employs more than 90,000.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Maritime Navigation	The nearest marine highways include the Atlantic Spine and Block Island Sound routes (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The impact during operation would be contingent upon the number of projects that use the port.
Commercial Shipping	The primary imports include salt, aluminum oxide, and cement, along with diverse bulk items such as propane and heating oils. Key exports feature scrap metals, automobiles, and various project materials. The port's location offers excellent connectivity through major highways (Interstates 95 and 195), a deep-water dock, and a railway supporting double stack cars, supporting its intermodal transport capabilities (ProvPort 2024a).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	Providence is not a "Top U.S." commercial fishing port (NOAA 2022b). Engagement score for Providence: low (NOAA 2020). Reliance score for Providence: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	There are various public access points and popular recreational fishing spots within a mile of the port (RICRMC 2024). Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with recreational ports, harbors, or public access points. Material impacts to recreationally fished stocks are not anticipated.
Recreational Resources	There are parks/protected areas, including state park land, resource management areas, conservation easements, city parks, and recreational fields within 5 miles of the port (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters during construction and operation. Tall cranes would be visible from recreational areas.
Tourism	75,520 persons (8.7% of employed persons) within the MSA are employed in "arts, entertainment, recreation, accommodations, and food services" (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Increased port traffic could increase congestion at nearby recreational areas. Potential degradation of soundscapes.
Housing and Lodging	There are over 11,000 housing units available within the MSA. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 400,342 within 5 miles of the port and is relatively high density. The population within the MSA is 1.7 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The 150 workers during construction would not materially increase MSA population. The creation of dozens of new jobs would be immaterial to a 1.7-million-person population.
Labor Force and Employment	The civilian labor force of the MSA is 900,000 and employment is 844,000. The unemployment rate is 5.8% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A construction workforce of 150 workers would not materially increase the labor force or decrease unemployment. Creation of dozens of operational jobs in a 900,000-person labor force with 5.8% unemployment would not be material.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Income Levels	The per-capita income is \$34,836 within 5 miles of the port and is \$42,869 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A construction workforce of 150 workers at prevailing wage levels would not materially alter income levels. Creation of dozens of operational jobs in a 900,000-person labor force with 5.8% unemployment would not result in a measurable increase in income levels.
Community Cohesion	The community cohesion indices reveal that the three nearest counties rank at the 17th, 15th, and 34th percentiles, respectively. Meanwhile, the county where the modification scenario area is situated falls even lower at the 8th percentile, demonstrating below-average community cohesion across all four areas (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Rhode Island was \$14.2 billion (Rhode Island Transparency Portal 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports eighteen hospitals and 110 schools are within 5 miles of the modification scenario area. Nearly 27% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

6 References

- 4Ward Planning, Inc. 2015 Jan 19. *The Economic Impact of ProvPort's Terminal Services*. Prepared for ProvPort. [accessed May 2024]. <https://www.provport.com/pdf/ProvPort%20Terminal%20Services%20Economic%20Impact%20Analysis%20FINAL%2012%2015.pdf>.
- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Cathcart D, Olson H. 2018. Revisiting Providence Cove Lands: Lessons in Curation and the Potential of Existing Collections. *Boxed but Not Forgotten (Again!): The Importance of Collections Driven Research*. Society for Historical Archaeology. [accessed 10 June 2024]. <https://core.tdar.org/document/441197/revisiting-providence-cove-lands-lessons-in-curation-and-the-potential-of-existing-collections>.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- City of East Providence. 2024. History. [accessed 10 June 2024]. <https://eastprovidenceri.gov/community/history>.
- East Providence Waterfront Commission. 2021. *The South Quay Marine Commerce Terminal, Future Multi-Modal and Offshore Wind Transportation Hub*. Prepared in partnership with Lloyd's Register, Rhode Island Waterfront Enterprises, Waterson Terminal Services, and the City of East Providence. [accessed May 2024]. https://www.eastprovidencewaterfront.com/wp-content/uploads/2021/03/South-Quay_Deck-EP-Waterfront-Commision.pdf.
- [EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Rhode Island Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ri.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 41°48'31.65"N 71°23'31.85"W. Street View. [accessed 9 May 2024].

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2019. Navigation Chart No. 13224. 41st ed. Last correction 15 Dec 2023.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. [https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344](https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344;);

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. Massachusetts and Rhode Island 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2024c. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Providence and Warwick Convention and Visitor Bureau. 2024. Providence History. [accessed 10 June 2024]. <https://www.goprovidence.com/things-to-do/historic-providence/providence-history/>.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

[ProvPort] ProvPort, Inc. 2023. Press Release: ProvPort Executes Lease to Develop and Operate East Providence Port Project. [accessed May 2024]. https://www.provport.com/pdf/ProvPort_RIWE%20FINAL.pdf.

[ProvPort] ProvPort, Inc. 2024a. Port of Providence Rhode Island. [accessed May 2024]. <https://www.provport.com/provport/provport.html>.

[ProvPort] ProvPort, Inc. 2024b. Facilities Overview. [accessed May 2024]. https://www.provport.com/provport/facilities_overview.html.

[RICRMC] Rhode Island Coastal Resources Management Council. 2023. Waterplace Park and Providence River Dredging Project – Phase 2. <http://www.crmc.ri.gov/dredging/wpprphase2.html>. Accessed June 2024.

[RICRMC] Rhode Island Coastal Resources Management Council. 2024. Rhode Island Recreational Fishing Tool. [accessed June 2024]. <https://storymaps.arcgis.com/stories/e296d57f7478431f8be2755545583dae>.

[RIDEM] Rhode Island Department of Environmental Management. 2023a. Bird Species [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[RIDEM] Rhode Island Department of Environmental Management. 2023b. Shellfish Harvest Restrictions [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[RIDEM] Rhode Island Department of Environmental Management. 2024. Natural Heritage Areas (2023) [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

S&P Global. 2024. Ports & Terminals Guide. [accessed 30 May 2024]. S&P Global Maritime Portal.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

University of Rhode Island Environmental Data Center. 2024. Submerged Aquatic Vegetation (SAV) in RI Coastal Waters (2021) [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot:marine-highways/about>.

PROVIDENCE

South Quay in East Providence, Rhode Island – 41°48'31.65"N, 71°23'31.85"W

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwspprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

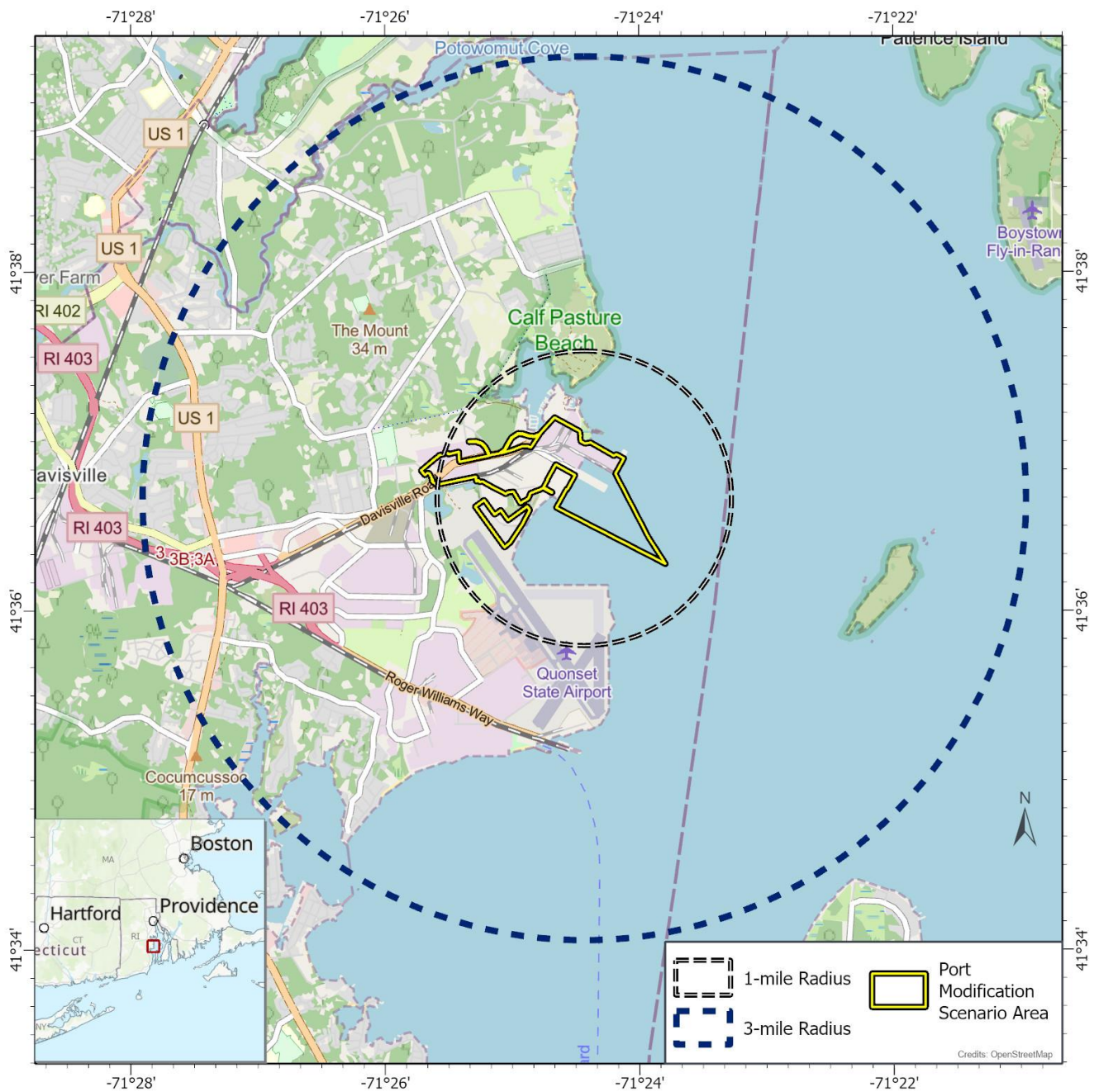
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

QUONSET / DAVISVILLE PORT PROFILE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Bureau of Ocean Energy Management

December 18, 2024



QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

1 Port Overview

Owner:	Quonset Development Corporation (QDC)
Operator:	QDC
Primary Existing Uses:	Commercial Shipping (Ro/Ro, Breakbulk, General Cargo)
Primary Existing Cargo:	Automobiles, Frozen Seafood (QDC 2020)
Existing Port Employment:	> 14,000 (QDC 2020)
Typical Operating Hours:	6:00 a.m. to 5 p.m. (Ports America 2024)
Terminal Land Area:	250 acres (Ports America 2024)
Closest Wind Energy Lease Area:	Revolution Wind, LLC (OCS-A 0486)
Distance to Closest Lease Area:	Approximately 33 miles
Potential Offshore Wind Port Uses:	Operations and Maintenance (O&M)

The Port of Quonset/Davisville is located North Kingstown, Rhode Island, near the mouth of Narragansett Bay. The port facilities include two piers and a bulkhead for approximately 4,500 linear feet of berthing space, on-dock rail, and approximately 60 acres of open laydown area (Quonset Development Corporation [QDC] 2020). The port has four berths and five terminals servicing several industries, including automobile processing, seafood, and cold storage, and has a 150-metric ton mobile crane. The existing Pier 1 is steel-supported with a concrete deck and has a loading capacity of approximately 1,000 pounds per square foot (QDC 2024a). Existing Pier 2 is earth-filled with a concrete deck and has a loading capacity of 1,000 pounds per square foot. Pier 2 also includes pile-supported heavy-lift platforms on each berthing face with load ratings of approximately 2,000 pounds per square foot. Both piers have berthing depths of 32 feet referenced to mean lower low water (QDC 2024a).

Access to the port from Narragansett Bay includes transit below the Claiborne Pell Bridge through the “East Passage” around Conanicut Island (National Oceanic and Atmospheric Administration [NOAA] 2019). The bridge is owned and operated by the Rhode Island Turnpike and Bridge Authority (RITBA) and includes a four-lane highway with a peak air space of less than 216.5 feet (RITBA 2018), which limits use of the port for offshore wind support outside of operations and maintenance (O&M) activities. The port is also adjacent to the Quonset State Airport, which would also limit the use of the port for activities beyond O&M, due to Federal Aviation Administration air space restrictions.

The Port of Davisville is part of Quonset Development Corporation’s (QDC’s) Quonset Business Park, which is a business and commercial district encompassing over 3,200 acres and includes the Quonset State Airport. The QDC is a quasi-state agency which is responsible for the development and management of the business park. In 2022, there were approximately 240 businesses operating in the park supporting approximately 25,000 full time equivalent jobs, accounting for 5% of all employment in the state (Tebaldi 2023). In 2023, the port received 260 calls from vessels and imported approximately 210,000 vehicles via ship (QDC 2023).

The land within the business park is described by the QDC as flat, with some portions of the park having less desirable soils for construction (without compaction and bearing capacity improvements) due to historic wetland filling (QDC 2019).

Significant expansions were recently undertaken, including new office buildings, expanded laydown areas, and the construction of two approximately 6,000 square foot hangars to support offshore wind energy services (QDC 2023). QDC and Orsted Wind Power North America completed construction of new berthing facilities to support offshore wind Crew Transfer Vessels, which will accommodate five vessels to act as an O&M port for nearby offshore wind projects (QDC 2023). The Port of Quonset/Davisville generates approximately \$375 million in annual revenue for the State of Rhode Island (QDC 2023).

Existing capabilities are summarized in Table 1-1.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	500 (NOAA 2019)
	Port Access Channel Controlling Depth (feet)	30 (NOAA 2019)
	Overhead / Air Draft Restriction (feet)	215 (Claiborne Pell Bridge) (RITBA 2018)
	Number of Berths	4
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	Pier 1: 4.88 Pier 2: 9.76
	Length (feet)	4,500
	Depth (feet)	32
	Suitable for Spud-Jacking (Yes/No)	Unknown (site not assessed) (Elkinton et al. 2014)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	6
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Not provided by QDC
	Haul Route Area Bearing Capacity (mt/m ²)	Not provided by QDC
	Approx. Size of Covered Storage Area (acres)	Not provided by QDC
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	Yes
	Width of Ro/Ro Berth (feet)	Not provided by QDC
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	Not provided by QDC
Cranes	Lifting Capacity (mt)	150
	Height Restrictions (Yes/No)	No
	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	Yes

Source: QDC (2024a), unless otherwise noted.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

As of the development of this report, the port has initiated design and construction of additional modifications. Pier 1 is being actively rehabilitated to enhance services for heavy lift operations. A new pier has been proposed to service Terminal 5, and is currently under construction (QDC 2024b), which will include docks, boat ramp, and gantry crane and would be referred to as the Terminal 5 Pier and the associated Blue Economy Support Docks (QDC 2024b). The new Terminal 5 is intended to both accommodate automobile cargo and support offshore wind (QDC 2023).

Modifications required for use to support offshore wind (as an O&M facility) include the additional projects planned by the QDC for design or construction starting in 2024, which include the following (QDC 2023): road connections to Rhode Island Route 403; general access and roadway improvements within the business park; electrical and security improvements for Terminals 4 and 5, Pier 1 rehabilitation and north face reconstruction; construction of new Terminal 5 pier; construction of docks and a boat ramp; dredging to accommodate use of the new Terminal 5 pier and the boat ramp; railroad crossing safety improvements; and general terminal and parking lot improvements.

In addition to these proposed modifications and projects, the QDC has also identified an opportunity to develop a campus to serve as a hub for offshore wind companies, which would include space for helicopter hangers, laydown areas, and office space. The QDC is seeking approximately \$40 million in funding for this Quonset Multi-Modal Offshore Wind Technology Campus, which has not been secured to date (QDC 2023).

According to the 2019 Quonset Business Park Master Land Use and Development Plan, modifications related to roadway improvements are expected to include construction of roads and ramps to provide new accessibility to expanded terminals and parcels within the business park. Roads will be widened and improved, utility lines will be raised, and security gates will be expanded to accommodate heavy, oversized freight trucks (such as those transporting turbine blades) (QDC 2019). Road improvements and new road construction are expected to include the

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

placement and compaction of aggregate and fill and paving. Construction of segments of new roads or accessways will also include land clearing, as applicable.

Modifications related to the rehabilitation of Pier 1 and the reconstruction of the north face include the placement and compaction of fill and aggregates, pile driving (or drilling), and paving of new surfaces. The ongoing construction of the new Terminal 5 pier is expected to include similar activities, with the addition of dredging to remove debris and soft sediment prior to pier construction and dredging to accommodate vessels using the new pier.

Based on review of existing depths reported on NOAA Nautical Chart 13221 (NOAA 2019), dredging for access to the new pier is anticipated to be less than 10,000 cubic yards and would likely be accomplished via mechanical means. Dredged material would require stabilization and potentially treatment prior to transport and disposal at an approved facility. Debris would also be removed and disposed of as appropriate.

Planned modifications related to increasing terminal storage area include some land clearing, grading, the placement and compaction of fill and aggregate, and surface paving. Modifications would also include installation of stormwater management systems, electrical utilities, and security improvements (e.g., fencing and gates).

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (i.e., new ship traffic related to OSW activities would represent an increase in emissions), an increase in local terrestrial cargo transportation (i.e., cargo and storage operations for wind turbine components), and associated worker activities.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Washington County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Washington County, Rhode Island, includes urban areas with a moderate population density and a sizable industrial base. Emission sources within the boundaries of Washington County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Washington County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Washington County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	32	6	2	<1	–
Biogenics*	266	46	–	–	–	3,660	219	–
Dust	–	–	–	435	75	–	–	–
Fires	53	1	0	6	5	13	3	795
Fuel combustion	2,058	425	14	322	318	318	110	–
Industrial processes[§]	48	43	1	182	31	135	5	94,331
Miscellaneous[†]	800	26	8	232	213	981	132	–
Mobile	9,510	1,262	11	96	61	796	222	497,047
Point-Sources	456	220	230	254	26	186	39	119,265
Total	13,191	1,023	264	1,559	735	6,091	731	711,438

Source: EPA (2023).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Washington County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Washington County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Washington County reported an O₃ design value of 67.3 parts per billion (ppb) on average for the 2019 to 2021 period, 66.0 ppb on average for the 2020 to 2022 period, and 68.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following assumptions:

- Construction would occur over 5 years.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	2.47	3.69	0.01	0.13	0.09	0.08	–	741.43
Nonroad Emissions	2.45	7.10	0.01	0.41	0.40	0.40	0.08	271.09
On-Road Emissions	1.51	0.11	<0.01	0.02	0.23	0.06	0.01	155.70
Fugitive Dust	–	–	–	–	46.34	4.64	–	–
Total	6.43	10.90	0.02	0.56	47.06	5.18	0.09	1,168.22

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from dredging expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day, 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.57	0.88	<0.01	0.04	0.02	0.02	–	235.92
Nonroad Emissions	0.04	0.10	<0.01	0.01	0.01	0.01	<0.01	41.58
On-Road Emissions	0.10	0.01	<0.01	<0.01	1.56	0.16	<0.01	12.25
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.28
Total	0.71	0.99	<0.01	0.05	1.59	0.19	<0.01	290.03

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTPy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 69.6 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from Project dredging during construction; however, the Project would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or O&M. These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Identified Cultural Resources: Review of confidential and publicly available reference sources identified multiple previously documented cultural resources within 3 miles of the Port of Davisville. These resources include structures associated with federally recognized and state-recognized historic districts as well as individual historic structures (Bureau of Ocean Energy Management [BOEM] 2021, 2023; National Park Service [NPS] 2024; RIHPHC 2024). The existing port buildings are not known to be historic, nor do they appear to be in available, recent aerial imagery street views (Google Earth Pro 2024). However, structures associated with the Quonset Point Naval Air Station do have historic associations (NPS 2024; RIHPHC 2024). Previous BOEM (2023) assessments at Quonset Point/Davisville suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structures of similar height and prominence to those being considered for port developments in this setting.

Terrestrial Archaeological Resources: Subsurface Pre-Contact archaeological sites are known to occur in areas where older soils persist undisturbed by historic and recent industrial and port developments either onshore, along the seashore, or submerged near shore (BOEM 2021, 2023). As many as 24 terrestrial archaeological sites were identified within a 3-mile radius of the port based on confidential sources (Environmental Design and Research [EDR] 2019; NPS 2024; Public Archaeology Laboratory [PAL] 2023; Revolution Wind, LLC, 2023; RIHPHC 2024). These include one archaeological district with National Historic Landmark status, encompassing a Contact period site, which may additionally contain burials (PAL 2023). The remainder of the archaeological sites are either field recommended as eligible or remain of undetermined eligibility for the NRHP (EDR 2019; PAL 2023). These archaeological sites are numbered and identified in the Rhode Island State Register, and include habitation, midden, camps, lithic and artifact scatters, and burials. In addition to these, **three** previously unknown sites and one isolated find spot were identified through archaeological testing within 3 miles of the port in a recent study; two of these resources are determined to be NRHP-eligible (PAL 2023).

Marine Archaeological Resources: Two submerged shipwrecks of unknown age were identified within a 3-mile radius of the port (NOAA 2024a). These resources were of undetermined NRHP eligibility. In addition, 18 aircraft wrecks over 50 years old are within a 3-mile radius (SEARCH 2023). These aircraft wrecks were undetermined NRHP eligibility.

Aboveground Historic Resources: One aboveground historic structure and three aboveground historic districts listed on the NRHP or the Rhode Island State Register are within 3 miles of the port based on search of publicly available databases (NPS 2024; RIHPHC 2024). There is one NRHP-listed historic structure within 1 mile of the port (NPS 2024; RIHPHC 2024).

Reviews of aerial imagery and historic maps for potentially eligible aboveground historic resources within the area surrounding the port indicate as many as 77 map-documented structures exist within a 3-mile radius of the port. Five of those are located more than 1 mile from the port, with one of those appearing on an 1855 map of Rhode Island (EDR 2019). Within a 1-mile radius of the Port of Davisville, as many as 72 map-documented structures exist for the period between 1942 and 1957. These structures included small residences, commercial or industrial buildings, and a cemetery (EDR 2019). Six extant structures within 1 mile of the port also appear on older maps dated between 1855 and 1919 (EDR 2019; Google Earth Pro 2024).

Cultural Resources Potential: Aerial imagery and historic topographic map review of the 1-mile study radius indicate the presence of potential cultural resources and historic structures near the modification scenario area (Google Earth 2024; RIHPHC 2024). Many of these historic areas, buildings, and structures relate to the emergence of Quonset/Davisville as a military air station and shipping and industrial center during the twentieth century.

Unknown terrestrial archaeological sites are of low potential within the modification scenario area or surrounding developed areas due to existing ground disturbances, but could occur adjacent in more deeply buried terrestrial and shoreline deposits or in undisturbed natural areas (wetlands, riparian zones, beaches). One geomorphic feature of archaeological interest was identified within a 3-mile radius of the port and may represent a relict river paleochannel with preserved terraces (SEARCH 2023). No marine archaeological sites were identified within 1 mile of the port based on available sources (NOAA 2024a; SEARCH 2023). Other unknown marine archaeological sites could occur in seafloor sediments or buried paleosols that are largely undisturbed by previous dredging, excavation, or coastal erosion. It is anticipated that aboveground historic cultural resources within a 1-mile radius of the port could be impacted physically by potential port modifications. None of the aboveground resources that are further than 1 mile from the port are expected to be subject to physical impacts from the potential port modifications.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high-intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the port. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats^{1,16,18}	• Located within a developed high-density land use area (industrialized); an airport is adjacent on the southwestern side. • Open water to east, and mixed forest systems to the north and west with areas of grassland within 1 mile. • Mid- and low- density residential areas and small forested areas are mixed in the landscape within 3 miles. • Within 1 mile, artificial paths and drainage have connected small ponds to adjacent transportation routes and the airport to the west. • Additional wetlands and larger streams are found within 3 miles.
Shoreline Habitats⁸	• Within the port footprint, manmade/ armored and riprap are the predominant shoreline category, with small pockets of vegetated bank and then sand beach extending north and south along the coast. • To the south these beaches are bounded by additional armored areas associated with the airport.
Submerged Marine Habitats^{10,12,13,14}	• Submerged Aquatic Vegetation patch mapped 2 miles south. • Waters within 1 mile are identified as approved shellfish harvest areas. • Benthic substrate is primarily sand with gravel pockets.
Designated Habitats / Places^{2,3,5,6,7,11,15,19}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies; Consolidated Highly Migratory Species. • Coastal Barrier Resource Area D02B is 2 miles to the north. • No Important Bird Areas, Critical Habitat, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species^{4,17}	• Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. • Roseate terns: coastal islands within 1 mile. • North Atlantic right whale and fin whales may occur within 1 mile. • Shortnose and Atlantic sturgeon may occur within 1 mile. • Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles^{9,17}	• Bald eagles, along with 29 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals⁷	• Harbor porpoises and Atlantic bottlenose dolphins likely present near port, in addition to Endangered Species Act (ESA)–protected species.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Resource Category	Existing Conditions
State Specific Resources^{9,10,11}	- Natural Heritage Area (NHA) 127 is located adjacent to the airport. - NHA 121 is located just north of the port. - Additional NHAs within 3 miles.

Sources: ¹ Multi-Resolution Land Characteristics Consortium 2021; ² National Audubon Society 2024; ³ NOAA 2021; ⁴ NOAA 2022; ⁵ NOAA 2023a; ⁶ NOAA 2023b; ⁷ NOAA 2023c; ⁸ NOAA 2024b; ⁹ Rhode Island Department of Environmental Management (RIDEM) 2023a; ¹⁰ RIDEM 2023b; ¹¹ RIDEM 2024; ¹² The Nature Conservancy (TNC) 2010; ¹³ TNC 2019; ¹⁴ University of Rhode Island Environmental Data Center 2024; ¹⁵ U.S. Fish and Wildlife Service (USFWS) 2023a; ¹⁶ USFWS 2023b; ¹⁷ USFWS 2024; ¹⁸ U.S. Geological Survey (USGS) 2022; ¹⁹ USGS 2024.

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition; dewatering	- Sediment disturbance and temporary increase in turbidity for approximately 5 miles (720 acres) of channel dredging. - Sediment disturbance and temporary increase in turbidity for dredging approximately 120 acres and pile driving/drilling activities associated with new berth.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of approximately 40 acres within an NHA, primarily mowed grass areas and wooded areas for new terminal/road construction.
Onshore Aquatic Habitats	None	No impacts to onshore aquatic habitats.
Shoreline	Sediment suspension and deposition	Temporary natural shoreline impacts adjacent to dredge footprint, including isolated salt/brackish marsh and coarse sand beach.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; aquatic habitat alteration	- Permanent loss of approximately 5 acres of subtidal habitat and benthic resources/ organisms due terminal construction. - Temporary loss of benthic habitat due to dredging (including maintenance dredging of berth). - Injury and mortality of benthic community and displacement of mobile organisms in path of dredging and adjacent sediment deposition.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	- Temporary acoustic impacts from construction vessel operation and pile driving (impulsive) activities leading to temporary behavioral changes. - Increased risk of injury or mortality due to vessel/equipment interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	- Temporary acoustic impacts from construction vessel operation. - Temporary acoustic impacts due to pile driving (impulsive) activities leading to temporary behavioral changes. - Increased risk of injury or mortality due to vessel/equipment interaction.
Sea Turtles	Aquatic noise; vessel/equipment interaction	- Temporary acoustic impacts from construction vessel operation. - Temporary acoustic impacts due to pile driving (impulsive) activities leading to temporary behavioral changes. - Increased risk of injury or mortality due to vessel/equipment interaction.
Birds and Bats	Terrestrial noise	- Temporary impacts due to construction, including pile driving, for birds and bats within 3 miles of the port; however, species are likely acclimated due to existing airport noise levels. - Acoustic impacts during operations would be consistent with existing land use.
Other Terrestrial Biota	Terrestrial noise	Temporary impacts due to construction and operations noise; however, species are likely acclimated due to existing noise from airport.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

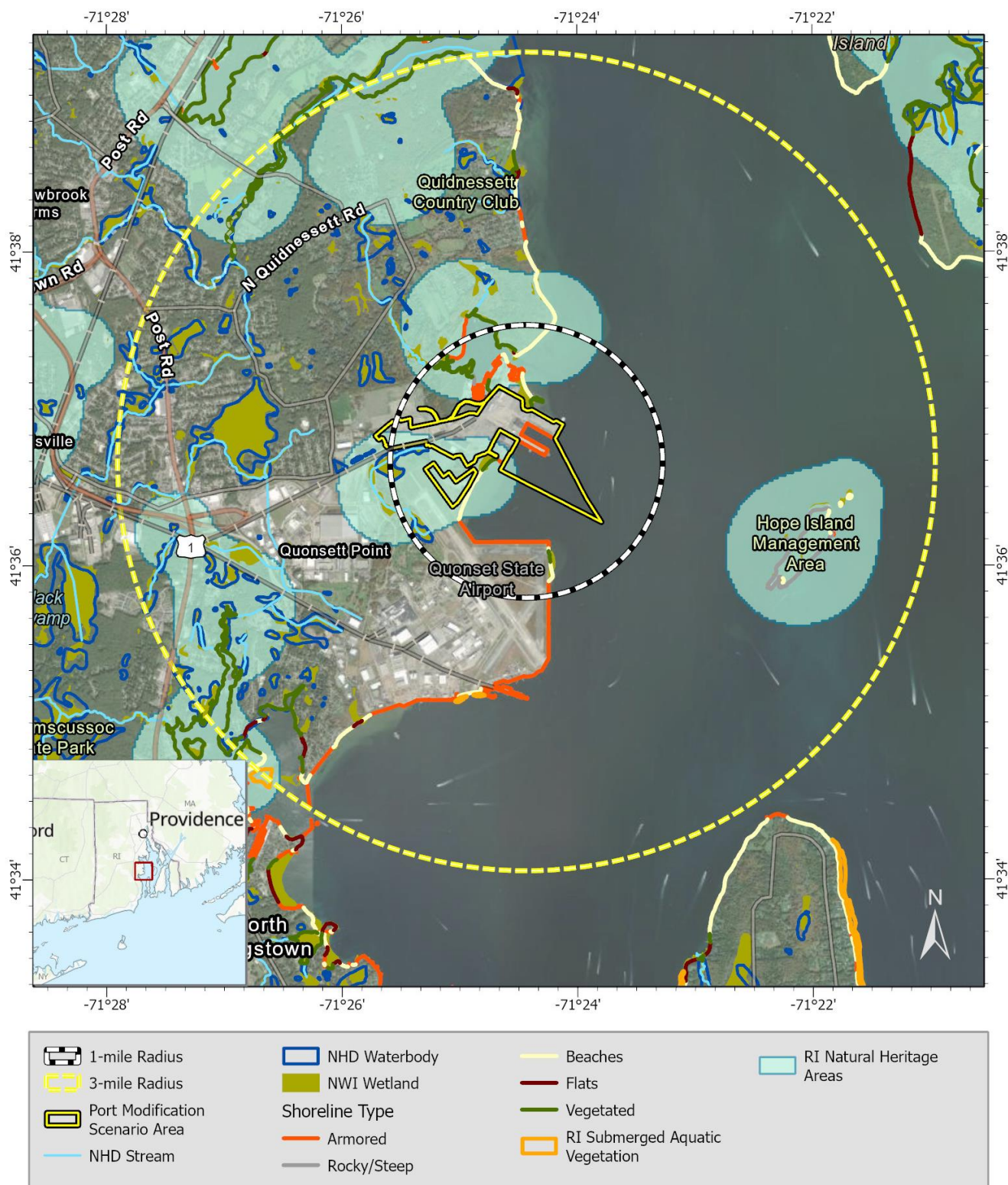


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2024c; RIDEM 2024; University of Rhode Island Environmental Data Center 2024; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern for potential adverse socioeconomic impacts. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the port is primarily mixed commercial and residential, with industrial uses immediately adjacent to the port (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	The Quonset State Airport is located just south of the port. I-95 is the nearest interstate and is more than 5 miles from the port. Large highways within 5 miles of the port include US 1 and RI 102, 401, and 403 (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	Two military use areas are located within 5 miles of the port: the Quonset State Airport and the Newport Naval Station (ArcGIS Online 2020).	Cranes interfering with airspace.	The addition of cranes at the port could potentially interfere with airspace for the Quonset State Airport, requiring coordination with the Federal Aviation Administration.
Visual	The port property and equipment are not generally visible from nearby residential and recreational areas due to intervening landscape (Google Maps 2024).	Cranes 60–300 feet tall during construction; lights and vessel activity during operation.	Port location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise dissipates within 0.5 mile, well before reaching the nearest residential areas.
Air Quality	The EPA reports 5 of 6 air quality metrics within 5 miles of the port are below the 50th percentile nationally. Ozone is in the 72nd percentile nationally. Asthma risk is in the 81st percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project would support renewable energy and is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 57th percentile nationally.	Project-related congestion.	Up to 20 additional personal vehicles per day during construction. During operation, the traffic associated with creation of up to 1,110 jobs would be added to a port that already employs more than 10,000.
Maritime Navigation	The nearest marine highways include the Atlantic Spine and Block Island Sound routes (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The impact during operation would be contingent upon the number of projects that utilize the port.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	The port focuses on cars and frozen seafood. Rail, road, and air transportation facilities exist within business park. There were 260 port calls in 2023 (USDOT 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	Davisville is not a commercial fishing port. Engagement score: low to medium (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	Davisville is not a recreational fishing port. Engagement score: medium (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Resources	There are parks/protected areas, including state park land and federal marine protected areas, within 5 miles of the port. Beaches are located north of the port and south of the airport (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Increased port traffic could increase traffic congestion at nearby recreational areas.
Tourism	75,520 persons (8.7% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Increased port traffic could increase congestion at nearby recreational areas.
Housing and Lodging	There are over 11,000 housing units available within the MSA. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 31,305 within 5 miles of the port and is relatively low density. The population within the MSA is 1.7 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The 20–80 workers during construction would not materially increase MSA population. The creation of 1,110 new jobs could draw workers to the MSA; the effect would be immaterial to a 1.7-million-person population
Labor Force and Employment	The civilian labor force of the MSA is 900,000 and employment is 844,000. The unemployment rate is 5.8% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A construction workforce of 20–80 workers would not materially increase the labor force or decrease unemployment. Creation of 1,110 operational jobs in a 900,000-person labor force with 5.8% unemployment would be material.
Income Levels	The per-capita income is \$53,911 within 5 miles of the port and is \$42,869 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A construction workforce of 20–80 workers at prevailing wage levels would not materially alter income levels. Creation of 1,110 operational jobs in a 900,000-person labor force with 5.8% unemployment could result in a measurable increase in income levels.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Community Cohesion	The three nearest counties have community cohesion index percentiles of 17, 22, and 36, indicating cohesion is below the national median (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Rhode Island was \$14.2 billion (Rhode Island Transparency Portal 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports two hospitals and 13 schools are within 5 miles of the port. Nearly 27% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be small as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

6 References

ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 April 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.

[BOEM] Bureau of Ocean Energy Management. 2021. *South Fork Wind Farm and South Fork Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM 2020-057. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. [accessed 29 April 2024]. <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/SFWF%20FEIS.pdf>.

[BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 30 April 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.

Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.

Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.

[EDR] Environmental Design and Research. 2019. Archaeological Assessment: Operations and Maintenance Facilities, South Fork Wind Farm, Rhode Island and New York, U.S. Confidential report on file, Bureau of Ocean Energy Management.

Elkinton C, Blatiak A, Ameen H. 2014. Assessment of Ports for Offshore Wind Development in the United States. Document no. 700694-USPO-R-03. U.S. Department of Energy. San Diego (CA): Garrad Hassan America, Inc. [accessed 23 September 2024]. https://www.energy.gov/sites/prod/files/2014/04/f14/wind_offshore_port_readiness.pdf.

[EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 April 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.

[EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Rhode Island Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ri.html.

[EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 April 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.

Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 April 2024]. <https://livingatlas.arcgis.com/landcover/>.

Google Earth Pro. 2024. Quonset/Davisville Port Modification Location. [accessed 29 April 2024].

Google Maps. 2024. 41°36'39.9"N 71°24'25.9"W. Street View. [accessed 29 April 2024]. <https://www.google.com/maps/place/41%C2%B036'39.9%22N+71%C2%B024'25.9%22W/@41.611075,-71.4097693,17z/data=!3m1!4b1!4m4!3m3!8m2!3d41.611075!4d-71.4071944?entry=ttu>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 April 2024]. <https://www.mrlc.gov/data>.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

National Audubon Society. 2024. Important Bird Areas. [accessed 4 April 2024].

<https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2019. Nautical Chart No. 13221. 63rd ed. [last correction 28 July 2023; accessed 19 Nov 2024]. <https://www.charts.noaa.gov/OnLineViewer/13221.shtml>.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 April 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 April 2024].

<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 April 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 April 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 April 2024].

<https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 April 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 April 2024].

<https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. Massachusetts and Rhode Island 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 4 April 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2024c. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 April 2024].

<https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[PAL] Public Archaeology Laboratory. 2023. Terrestrial Archaeological Resources Assessment and Site Identification Survey Revolution Wind Farm Project. Confidential report on file, Bureau of Ocean Energy Management.

Ports America. 2024. Our Locations: Davisville, RI. [accessed 4 April 2024]. <https://www.portsamerica.com/our-locations/davisville-ri>.

[QDC] Quonset Development Corporation. 2019. *Quonset Business Park Master Land Use and Development Plan*. [accessed 4 April 2024]. <https://quonset.com/wp-content/uploads/2023/05/QDC-Master-Plan-Sept-2019-ADOPTED.042021.pdf>.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

[QDC] Quonset Development Corporation. 2020. Port of Davisville Quonset Business Park [brochure]. [accessed 4 April 2024]. https://quonset.com/wp-content/uploads/2022/12/POD_Insert_2020_rev1.pdf.

[QDC] Quonset Development Corporation. 2023. *2023 Annual Statutory Report*. [accessed 4 April 2024]. <https://quonset.com/wp-content/uploads/2024/01/2023-Annual-Statutory-Report-FINAL-2024-01-10-reduced-size.pdf>.

[QDC] Quonset Development Corporation. 2024a. Port of Davisville – Port Facilities. [accessed 4 April 2024]. <https://quonset.com/port-facilities/>.

[QDC] Quonset Development Corporation. 2024b. Rhode Island Leaders Celebrate new Terminal 5 Pier. [accessed 21 November 2024]. <https://quonset.com/rhode-island-leaders-celebrate-new-terminal-5-pier/>.

Revolution Wind, LLC. 2023. *Construction and Operations Plan: Revolution Wind Farm Volumes I and II*. [accessed 30 April 2024]. <https://www.boem.gov/renewable-energy/state-activities/revolution-wind-farm-construction-and-operations-plan>.

Rhode Island Transparency Portal. 2024. Revenue Data. [accessed 29 April 2024]. <http://www.transparency.ri.gov/revenues/>.

[RIDEM] Rhode Island Department of Environmental Management. 2023a. Bird Species [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[RIDEM] Rhode Island Department of Environmental Management. 2023b. Shellfish Harvest Restrictions [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[RIDEM] Rhode Island Department of Environmental Management. 2024. Natural Heritage Areas (2023) [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[RIHPHC] Rhode Island Historical Preservation and Heritage Commission. 2024. State of Rhode Island Historic Property Search [database]. [accessed 30 April 2024]. <https://preservation.ri.gov/historic-places>.

[RITBA] Rhode Island Turnpike and Bridge Authority. 2018. History – Claiborne Pell Bridge. [accessed 4 April 2024]. <https://www.ritba.org/history/>.

[SEARCH] SEARCH, Inc. 2023. Marine Archaeological Resources Assessment Revolution Wind Farm Project Construction and Operations Plan. Confidential report on file, Bureau of Ocean Energy Management.

South Fork Wind, LLC. 2021. *Construction and Operations Plan South Fork Wind Farm*. [accessed 29 April 2024]. <https://www.boem.gov/sites/default/files/documents/renewable-energy/South-Fork-Construction-Operations-Plan.pdf>.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Tebaldi E. 2023. *2023 Report on the Economic Impact of the Quonset Business Park*. Prepared for the Quonset Development Corporation. June 2023.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

QUONSET / DAVISVILLE

Port of Davisville in North Kingstown, Rhode Island – 41°36'45" N, 71°24'19" W

[TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston, Massachusetts: Eastern Resource Office of The Nature Conservancy. [accessed 24 April 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 24 April 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

University of Rhode Island Environmental Data Center. 2024. Submerged Aquatic Vegetation (SAV) in RI Coastal Waters (2021) [dataset]. Rhode Island Division of Planning Rhode Island Geographic Information System (RIGIS). [accessed 4 April 2024]. <https://www.rigis.org/>.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed April 2024]. Available from: <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed April 2024]. Available from: <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed April 2024]. Available from: <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USDOT] U.S. Department of Transportation. 2024. Port Profiles 2024. Bureau of Transportation Statistics. [accessed 29 April 2024]. <https://explore.dot.gov/views/PortProfiles2024/HomeDashboard?%3Aembed=y>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 April 2024]. <https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 April 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 April 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 April 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 25 April 2024]. <https://doi.org/10.5066/P96WBCHS>.

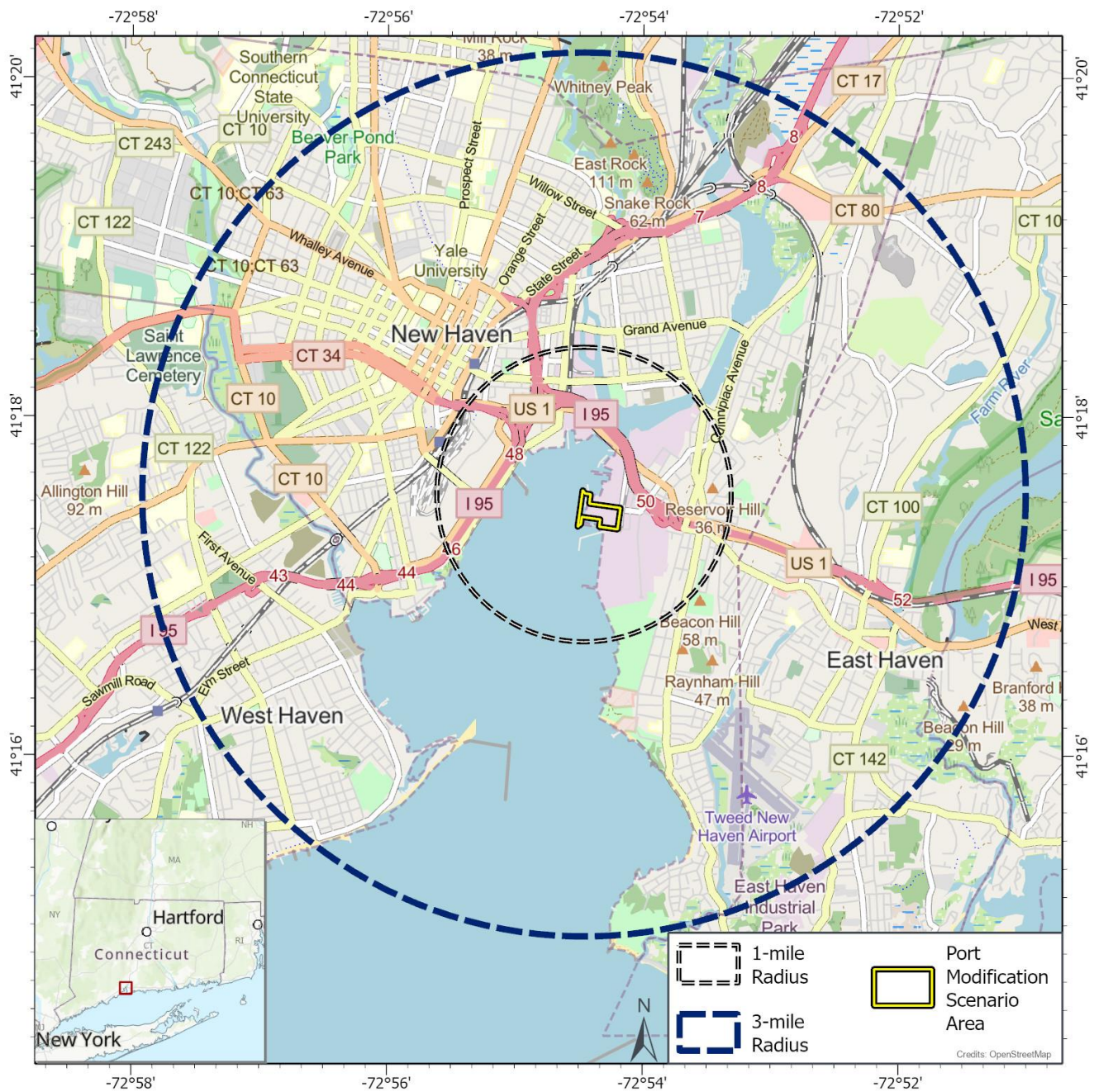
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

NEW HAVEN PORT PROFILE

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Bureau of Ocean Energy Management

December 18, 2024



NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

1 Port Overview

Owner:	Gateway Terminal (Gateway Terminal 2024)
Operator:	Gateway Terminal (Gateway Terminal 2024)
Primary Existing Uses:	Commercial cargo, intermodal transloading (Gateway Terminal 2024)
Primary Existing Cargo:	Break bulk, dry bulk, liquid bulk (Gateway Terminal 2024)
Existing Port Employment:	500 (Newhaven Port and Properties 2012)
Typical Operating Hours:	7 a.m. to 4 p.m. (Gateway Terminal 2024)
Terminal Land Area:	60 acres (Gateway Terminal 2024)
Closest Wind Energy Lease Area:	South Fork Wind (OCS-A 0517)
Distance to Closest Lease Area:	Approximately 103 nautical miles
Potential Offshore Wind Port Uses:	Staging and assembly

The Port of New Haven, Connecticut, is the highest volume commercial shipping port on Long Island Sound and is one of the busiest ports between Boston, Massachusetts, and New York City. It is located at the junction of interstate highways I-95 and I-91 and has access to on-site freight rail service. The port district encompasses a total of 366 acres and primarily manages general bulk, break bulk, scrap metal, cement, stone, petroleum products, and project cargo (City of New Haven 2024a). There are seven privately owned and operated terminals within the port district (City of New Haven 2024b). The Port of New Haven is accessed from Long Island Sound via a federal navigation channel, which has a project depth of 35 feet (National Oceanic and Atmospheric Administration [NOAA] 2012).

The terminal selected for evaluation in this study is Gateway Terminal, which is privately owned and operated. Gateway Terminal manages break bulk, dry bulk, and liquid bulk. The terminal itself occupies 8 acres and has over 50 additional acres of available land. The terminal includes a 750-linear-foot concrete finger pier, two 300-linear-foot docks, a 225-linear-foot wharf, and over 200,000 square feet of covered storage. The terminal also has a petroleum tank farm capable of holding approximately 650,000 barrels of liquid products and multiple existing 57-ton capacity gantry cranes for material handling (Gateway Terminal 2024). The quayside bearing capacity at the terminal is approximately 2,000 pounds per square foot (psf), estimated without direct testing, as noted in the Connecticut Offshore Wind Strategic Study (Eastern Connecticut Chamber of Commerce 2021).

No specific build-out plans or concepts are publicly available at the time of this report production; however, the Port of New Haven is cited as a deepwater port “key asset” in Connecticut’s Offshore Wind Strategic Roadmap (Connecticut Department of Economic and Community Development [DECD] 2023). The State Pier in New London, Connecticut, is currently being used to support the South Fork Wind, Revolution Wind, and Sunrise Wind Projects (DECD 2023). As additional offshore wind farms are developed, New Haven is one of two additional deepwater ports in Connecticut (along with Bridgeport) that could be modified to support offshore wind.

Existing capabilities are summarized in Table 1-1.

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	400 (City of New Haven 2024a)
	Port Access Channel Controlling Depth (feet)	35 (NOAA 2012)
	Overhead / Air Draft Restriction (feet)	Unlimited
	Number of Berths	12 (American Association of Port Authorities 2012)
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	9.8 (Eastern Connecticut Chamber of Commerce 2021)
	Length (feet)	1,575 (Gateway Terminal 2024)
	Depth (feet)	35 (NOAA 2012)
	Suitable for Spud-Jacking (Yes/No)	Yes

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Capability Area	Criteria (Units)	Value
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	50 (Gateway Terminal 2024)
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Not provided by Gateway Terminal
	Haul Route Area Bearing Capacity (mt/m ²)	Not provided by Gateway Terminal
	Approx. Size of Covered Storage Area (acres)	4.6 (Gateway Terminal 2024)
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	No (S&P Global 2024)
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	Two 50+ ton gantry cranes (S&P Global 2024)
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	Yes

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

Based on the available land area, which is currently occupied and would require redevelopment, the potential use for the Port of New Haven to support offshore wind would include use as a staging and assembly port or as an operations and maintenance (O&M) port. This report evaluates the modifications required to modify Gateway Terminal for staging and assembly use based on the parameters presented in the New York State Offshore Wind Master Plan Assessment of Ports and Infrastructure (New York State Energy Research and Development Authority [NYSERDA] 2017).

Recommended requirements for staging and assembly or installation ports include approximately 25 acres for upland storage and laydown areas, with a 4,000 psf ground bearing capacity, and wharf lengths of 330 to 650 linear feet (NYSERDA 2017). In addition, the port requires a minimum 400-foot air draft and a 38-foot-deep berth to support staging and assembly operations.

Modifications required at Gateway Terminal to meet these requirements would include dredging, construction of a steel-pile-supported or coffer dam-supported wharf, the redevelopment of the upland site, and modifications to improve ground bearing capacity. Additional modifications would include improvements to stormwater collection and management systems, security fencing and gates, and modifications to existing access.

Modifications required for wharf construction would include the driving of steel pipe piles to support a reinforced concrete deck platform that would be 850 feet in length and 200 feet wide to support a mobile or fixed crane. Based on similar concepts presented for other staging and assembly ports, it is assumed that a steel sheet pile bulkhead would be driven at the face of the wharf, and a stone revetment slope would be constructed under the wharf to provide scour protection. It is assumed that the wharf would have a target live load bearing capacity of 4,000 psf, consistent with parameters for the upland portion of the site (NYSERDA 2017). For the purposes of this analysis, it is assumed that the wharf deck would be constructed from reinforced concrete to provide adequate bearing capacity for loading and unloading activities.

Modifications required to develop and expand the storage area at Gateway Terminal would include the decommissioning and demolition of existing structures, which includes approximately 25 petroleum or other liquid storage tanks, based on a review of aerial imagery. Following demolition, existing paving would be removed, and fill and aggregate would be imported and compacted. Based on the size of the area (approximately 17 acres), it is assumed that both temporary surcharge loads and vibratory rolling compactors would be used to induce compaction and improve ground bearing capacity. Security fencing, gates and lighting would also be installed around and within the storage area.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Modifications related to access improvements at Gateway Terminal include increasing the ground bearing capacity to manage the required loads moving from the storage area to the wharf in a similar manner as described previously for the storage area improvements. Also, similar to the storage area improvements, access way modifications would include the installation of security fencing, gates, and lighting.

To provide access to the proposed wharf, approximately 67,000 cubic yards of dredging would be required in an approximately 2.8-acre dredge footprint that would connect the wharf to the existing federal channel, based on existing depths reported on NOAA navigation chart 12371 (NOAA 2012). Based on the volume and area proposed for dredging, it is assumed that dredging would be conducted via mechanical means (e.g., crane and dredge bucket). Dredging activities would include dredged material dewatering, stabilization, processing and disposal, and water treatment.

There are no air draft restrictions for use of Gateway Terminal.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling and berthing at the site, which would increase emissions; an increase in local terrestrial cargo transportation within the site and for employees and other off-site transportation activities (also increasing emissions); and associated worker activities on-site, such as moving and assembling components.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in New Haven County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: New Haven County, Connecticut, includes urban areas with a moderate to high population density and a sizable industrial base. Emission sources within the boundaries of New Haven County, within the region, and within neighboring metropolitan areas affect the county's air quality. The New Haven County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fires being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023a). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for New Haven County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	86	17	7	1	–
Biogenics*	554	86	–	–	–	7,438	478	–
Dust	–	–	–	2,030	308	–	–	–
Fires	49	1	–	5	4	12	2	647
Fuel Combustion	7,050	2,392	59	1,198	1,155	974	331	–
Industrial Processes§	–	–	–	–	–	178	9	–
Miscellaneous†	521	6	1	766	705	637	108	–
Mobile	52,286	5,154	29	528	265	3,587	1,064	3,966,488
Point-Sources	370	354	55	98	97	338	79	4,058,106
Total	60,830	7,993	144	4,711	2,551	13,171	2,072	8,025,241

Source: EPA (2023a).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes include various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance (EPA 2023b). New Haven County is in nonattainment of the National Ambient Air Quality Standard (NAAQS) for the 2008 8-hour ozone, and maintenance for 1971 CO and 2006 PM_{2.5} standards (EPA 2024a). Therefore, the General Conformity Rule is applicable.

New Haven County is in nonattainment for the 8-hour ozone standard; therefore, NO_x will be evaluated as a precursor of O₃. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration, averaged over three years. Ambient air quality monitors in New Haven County reported an O₃ design value of 75.0 parts per billion (ppb) for the 2019 to 2021 period, 73.0 ppb on average for the 2020 to 2022 period, and 70.6 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats and survey vessels. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 4 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 12 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	6.26	11.99	0.02	0.49	0.31	0.30	–	2,490.82
Nonroad Emissions	1.75	5.42	0.01	0.32	0.28	0.27	0.16	2,538.39
On-Road Emissions	2.42	0.18	<0.01	0.03	0.36	0.09	0.01	248.66
Fugitive Dust	–	–	–	–	1.43	0.14	–	–
Total	10.43	17.59	0.03	0.84	2.38	0.80	0.17	5,277.87
Conformity De Minimis levels¹	100	25	–	25	–	100	N/A	N/A

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year; N/A

¹ De Minimis levels for Severe 15 nonattainment for the 2008 8-hour ozone standard, Moderate nonattainment for the 2018 8-hour ozone standard, and maintenance for CO and PM_{2.5}.

Air emissions from dredging expansion would not likely add appreciably to existing emissions and would be less than applicable Conformity de minimis levels. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.57	0.52	<0.01	0.01	0.01	0.01	–	190.89
Nonroad Emissions	0.03	0.13	<0.01	0.01	0.01	0.01	<0.01	65.93
On-Road Emissions	0.13	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	13.52
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12
Total	0.73	0.66	<0.01	0.02	0.02	0.02	<0.01	270.46

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 53.45 kilometers. While the airshed is currently in nonattainment, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct, and indirect impacts on air quality in the region because of emissions from dredging during construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The New Haven port modification scenario area falls within the City of New Haven and includes myriad historic resources. Review of the confidential Connecticut Cultural Resources Information System (ConnCRIS) database and publicly available reference sources identified more than 12,000 historic aboveground and archaeological resources within the City of New Haven (DECD 2024; National Park Service [NPS] 2024). Inventory points consisted of archaeological districts and sites, and aboveground historic areas, buildings, and structures recorded as cultural resources at the local, state, and federal levels. Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structures of similar height and prominence to those potentially being considered for port developments in this setting.

The Port of New Haven receives the highest volume of commercial shipping on Long Island Sound (City of New Haven 2024c). Construction of wharves in New Haven Harbor began as early as 1663, and continued as the city became a center for commerce through the eighteenth and nineteenth centuries (ConnecticutHistory.org 2024). The modification scenario area is on Waterfront Street at the Port of New Haven's Gateway Terminal. This terminal was established in 1985 and encompasses ship, barge, truck, and rail capacity (ConnecticutHistory.org 2024; Gateway Terminal 2024). The terminal is situated within a commercial and industrial zone on the east side of New Haven Harbor and encompasses 60 acres, including separate docks and a wharf. This also includes a covered storage area and a petroleum tank farm (Gateway Terminal 2024). There is limited visual screening from trees and other vegetation along the east side of the terminal near I-95; however, Gateway Terminal is surrounded by similar existing industrial development. To the west, the terminal faces New Haven Harbor and another portion of I-95 across the harbor. Across the harbor, I-95 is paralleled on either side by Long Wharf Drive and Sargent Drive, with sparse rows of trees fronting more industrial buildings along Sargent Drive (Google Earth 2024). The potential modifications at Gateway Terminal would remove the tank farm then add to the existing structures and industrial use of the port in a manner consistent with the existing industrial character and activities of the port district and I-95 development.

Terrestrial Archaeological Resources: There are 40 terrestrial archaeological sites, including Pre-Contact, Contact, and Post-Contact Native American and Historic period archaeological sites known to occur within a 3-mile radius. These sites are identified as camp sites, village sites, shell middens, lithic scatters, and burials in the confidential ConnCRIS database (DECD 2024). The 3-mile study radius encompasses portions of the City of New Haven, West Haven, Allintown, West River, Fair Haven, East Haven, and East Shore (Google Earth 2024).

Within 1 mile of the modification scenario area, 13 Pre-Contact and Historic period archaeological sites were identified. Seven Pre-Contact sites, including camp sites, villages, and cemeteries were listed in the confidential ConnCRIS database; these were listed as either destroyed or of unknown preservation status (DECD 2024; NPS 2024). Six additional Historic sites were noted in the ConnCRIS database, including industrial or commercial resources with good to fair preservation status (DECD 2024). Overall, the archaeological site data indicates an area of low to moderate frequency for archaeological resources. Older soils, retaining archaeological potential, could persist undisturbed by historic or modern wharf construction or existing harbor developments near Gateway Terminal.

Marine Archaeological Resources: There are four known shipwrecks from New Haven Harbor inventoried in the confidential ConnCRIS database (DECD 2024; NOAA 2024a; Shelton 2010). These shipwrecks are found within 1 mile of the modification scenario area and include resources from the late eighteenth, nineteenth, and early twentieth centuries, and one wreck of unknown age.

Aboveground Historic Resources: Within a 3-mile radius, there are approximately 1,881 aboveground historic inventory points listed in the confidential ConnCRIS database (DECD 2024). These include resources eligible for or listed in the NRHP, as well as aboveground resources ineligible for the NRHP or with undetermined status (DECD 2024; NPS 2024). These inventory points are situated within the City of New Haven, West Haven, Allintown, West River, Fair Haven, East Haven, and East Shore (Google Earth 2024). These historic resources consist of dwellings, structure, houses of worship, schools, municipal buildings, outbuildings, commercial or industrial buildings,

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

landscape elements, and other facilities determined to be significant cultural resources at the local, state, and federal levels (DECD 2024; NPS 2024).

Approximately 290 documented cultural resource inventory points are within a 1-mile radius (DECD 2024; NPS 2024). These resources are centered in downtown New Haven and the Long Wharf and Wooster Square neighborhoods, and consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists with undetermined, eligible, or listed status on the NRHP (DECD 2024; NPS 2024). The historic property data indicates a relatively high frequency of aboveground historic resources.

Within 3 miles, there are approximately 30 National Register Districts (DECD 2024; NPS 2024). Five of these districts are within a 1-mile radius and collectively encompass over 300 contributing elements (DECD 2024; NPS 2024).

Cultural Resources Potential: Reviews of aerial imagery and historic maps through time within a 1-mile radius of the Port of New Haven indicate the presence of multiple cultural resources and historic structures near the modification scenario area (Google Earth 2024). Historic buildings and structures surrounding the modification scenario area to and across I-95 may include those related to the emergence of New Haven as an historic shipping center during the seventeenth and eighteenth centuries and as it persisted historically through the nineteenth and twentieth centuries (City of New Haven 2024c).

Terrestrial archaeological sites are of low to moderate potential in the proposed modification scenario area and surrounding areas but could occur adjacent in more deeply buried terrestrial deposits or in undisturbed natural areas (intact shoreline sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Due to the extensive paving on the pier, port modifications would affect a limited amount of terrestrial soils or additional shoreline sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on confidential and publicly available sources (DECD 2024; NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in shore or harbor sediments that are largely undisturbed by previous dredging, excavation, or erosion. Potential port modifications would affect a limited area of shoreline sediments with potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{5,16,18}	- Situated on New Haven Harbor at the confluence of Quinnipiac and Mill Rivers, within an existing port and industrialized area; surrounded by high and medium density (urban) residential housing, decreasing in intensity at approximately 2 miles. - New Haven Harbor flows into Long Island Sound approximately 3 miles from the port. - The West River drains into the Harbor, south of the port, along the west bank, and the Farm River/Lake Saltonstall flows within 3 miles to the east of the port. - The terrestrial site footprint is fully developed. - Isolated wetlands, ponds, and intermittent streams occur within 1 mile; Larger drainage and stream complexes within forested habitats, marshes and swamps, and intertidal/estuarine wetlands occur to the southeast at 2 miles, associated with shoreline habitats on Long Island Sound. - Approximately 210 acres of local parks and public access areas within 1 mile.
Shoreline Habitats ⁸	- Within the modification scenario area, manmade/ armored and riprap are the predominant shoreline category. - Shorelines within 1 mile to the north exhibit similar armored characteristics as the modification scenario area. - Shorelines south and on the west bank of the river are a mixture of tidal flats, saltmarshes, and armored features; shorelines exhibit more natural types increasing in distance from the New Haven Harbor proper, including tidal flats, vegetated banks, and sand beach.
Submerged Marine Habitats ^{3,13,14}	- Benthic substrate in the larger New Haven Harbor is predominantly silt and mud. - Oyster and hard clam habitats identified approximately 2 miles from the modification scenario area and into Long Island Sound. - No Submerged Aquatic Vegetation (SAV) identified within 3 miles.
Designated Habitats / Places ^{6,7,9,10,11,12,15,17,19}	- Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies; Consolidated Highly Migratory Species. - Habitat Areas of Particular Concern (HAPCs) for Summer Flounder SAV within 1 mile. - Five Important Bird Areas are found within 1 to 3 miles, to the north, west, and south of the modification scenario area. - Two Coastal Barrier Resources Areas occur within approximately 2 miles to the south of the modification scenario area: CT-14P, CT-15P. - No Critical Habitat or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{9,17}	- Tricolored bat: forested habitat and flyways within 1 mile. - Roseate terns and rufa red knot: coastal habitats within 1 mile. - Piping plover coastal habitat within 3 miles. - Shortnose and Atlantic sturgeon may occur within 1 mile. - Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles ^{2,17}	Bald eagles, along with 31 species of migratory birds (some with state protections) have suitable habitat within 1 mile.
Marine Mammals ^{10,12}	Harbor porpoises and Atlantic bottlenose dolphins likely present near port.
State Specific Resources ^{1,2,3,4}	- Connecticut Critical Habitats located within 3 miles to the south (Morse Point Beach – beach habitat), within 3 miles to the north (Quinnipiac River – brackish marsh habitat), and within 3 miles to the west (West River Marsh – freshwater marsh habitat). - Natural Diversity Areas are found throughout the area within 1 mile, primarily associated with the above discussed river systems. - Migratory Waterfowl Concentration Areas occur within the modification scenario area (black duck, bufflehead, canvasback, goldeye, mallard), and to the south (goldeneye, and scaup).

Sources: ¹Connecticut Department of Energy and Environmental Protection (CTDEEP) 2023a; ²CTDEEP 2023b; ³CTDEEP 2023c; ⁴CTDEEP 2024a; ⁵Multi-Resolution Land Characteristics Consortium 2021; ⁶National Audubon Society 2024; ⁷NOAA 2021; ⁸NOAA 2022a; ⁹NOAA 2022b; ¹⁰NOAA 2023a; ¹¹NOAA 2023b; ¹²NOAA 2023c; ¹³U.S. Fish and Wildlife Services 2023a; ¹⁴USFWS 2023b; ¹⁵USFWS 2024; ¹⁶U.S. Geological Survey (USGS) 2022; ¹⁷USGS 2024.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

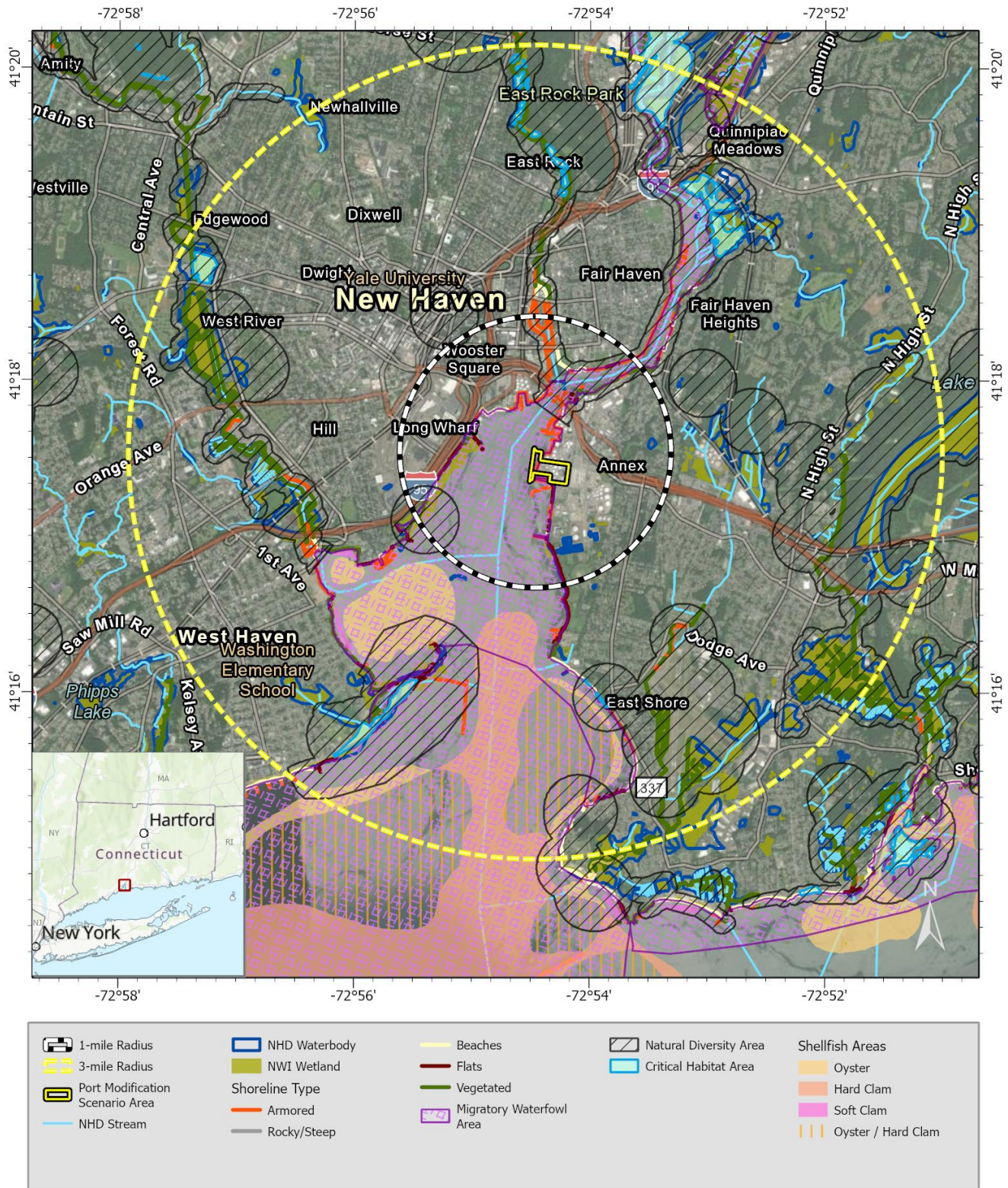


Figure 4-1. Existing habitats and natural resource areas.

Sources: CTDEEP 2023a, 2023b, 2023c, 2024b; NOAA 2024b; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Sediment disturbance and temporary increase in turbidity for dredging, pile driving/drilling, and coffer dam dewatering activities associated with new berth.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	No terrestrial habitat alteration anticipated. Modification scenario area is sited within an existing fully developed port terminal.
Onshore Aquatic Habitats	None	No onshore aquatic habitat alteration anticipated. Modification scenario area is sited within an existing fully developed port terminal.
Shoreline	Habitat alteration	Permanent loss of riprap shoreline within the modification scenario area; however, this shoreline type is fairly ubiquitous along the riverbanks and provides low-quality habitat.
Submerged Marine Habitats / Benthic Resources	Habitat alteration	Temporary loss of ~3 acres of benthic habitat and resources due to dredging for new berth access. Conversion of 3.75 acres soft bottom habitat to hard bottom (piles and rock) habitat under the new wharf. This area is inclusive of HAPC for summer flounder, ubiquitous throughout the region.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species and species within Natural Diversity Areas within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation. Temporary acoustic impacts due to pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, and Natural Diversity Areas within 1 mile are at risk from temporary acoustic disturbances. Acoustic impacts during operations would be consistent with existing land use.
Other Terrestrial Biota	Terrestrial noise	Impacts due to construction and operations noise may occur within Natural Diversity Areas within 1 mile of the modification scenario area. Acoustic impacts during operations would be consistent with existing land use.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern for potential adverse socioeconomic impacts. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	The port district is a highly developed industrial zone. Within a 5-mile radius, beyond this zone, land use predominantly consists of urban residential and commercial areas, with public parks interspersed (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	The Tweed New Haven Airport is located just south of the port. I-95 is the nearest interstate and is next to the port, and I-91 is less than 1 mile away. Other large highways within 5 miles of the port include US 1, US 5, and CT 337, CT 10, CT 15, CT 142, CT 122, CT 34, CT 243, and CT 63. Amtrak Railroad and CSX Railroad are within 5 miles of the port (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	There are no active military use areas within 5 miles of the port (ArcGIS Online 2020).	None.	In the proposed port modification scenario, special use areas would not be affected.
Visual	The existing terminal property and equipment are visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes 60–300 feet tall during construction; lights and vessel activity during operation.	Terminal location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible but are generally consistent with existing industrial activity at the terminal.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. Operational noise is expected to reach nearby commercial and recreational areas but will dissipate within 0.5 mile, preventing any disturbance to residential zones.
Air Quality	The EPA reports 3 of 6 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Ozone, Diesel Particulate Matter, and Toxic Releases to Air are in the 97th, 54th, and 92nd percentile nationally, respectively. Asthma risk is in the 88th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 88th percentile nationally.	Project-related congestion.	Up to 150 and 750 additional personal vehicles per day during construction and operation respectively, will be an immaterial addition to a city that employs 65,000 and has robust surrounding traffic infrastructure.
Maritime Navigation	The nearest marine highway is the Long Island Sound route (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The impact during operation would be contingent upon the number of projects that use the port.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	Gateway Terminal focuses on petroleum products, petroleum, asphalt, cement, steel, scrap metal, sand, salt, and lumber, among other cargoes. Rail, road, pipeline, and air transportation facilities are accessible from the terminal (City of New Haven 2024a).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	New Haven is not a "Top US" commercial fishing port (NOAA 2022c). Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	There are various public access points and popular shore and boat fishing sites within 1 mile of the port. Engagement score: medium-high (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area overlaps with regions of popular recreational fishing use, though the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	Within 5 miles of the port, there are parks/protected areas, including state park land, state resource management areas, watershed protection areas, state marine protected areas, and city parks (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters during construction and operation. Tall cranes would be visible from recreational areas.
Tourism	34,190 persons (7.9% of employed persons) within the MSA are employed in "arts, entertainment, recreation, accommodations, and food services" (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Increased port traffic could increase congestion at nearby recreational areas.
Housing and Lodging	4, 837 of the 24,399 vacant housing units in the MSA are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 358,323 within 5 miles of the port and is relatively low density. The population within the MSA is 866,377 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The 150 workers during construction would not materially increase MSA population. The creation of 750 new jobs could draw workers to the MSA; the effect would be immaterial to an 866,377-person population.
Labor Force and Employment	The civilian labor force of the MSA is 462,537 and employment is 433,106. The unemployment rate is 6.4% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 150 workers during construction and 750 during operation would not materially increase the labor force or decrease unemployment.
Income Levels	The per-capita income is \$34,672 within 5 miles of the port and is \$45,314 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of 150 workers during construction and 750 during operation at prevailing wage levels would not materially alter income levels.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Community Cohesion	The county containing the modification scenario area (New Haven County) ranks in the 15th percentile on the national Community Cohesion Index, as reported by Chetty et al. (2022), indicating a level of cohesion below the national median. The four adjacent counties also show below-median cohesion, with Community Cohesion Index percentiles of 17, 38, 16, and 30, respectively.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Connecticut was \$23.1 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports sixteen hospitals and 66 schools are within 5 miles of the port. Nearly 31% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident	Changes to population levels would be relatively minor as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- American Association of Port Authorities. 2012. The New Haven Port Authority [seminar presentation]. [accessed June 2024]. <https://www.aapa-ports.org/files/SeminarPresentations/2012Seminars/12MEDC/Sheiffle.pdf>.
- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- City of New Haven. 2024a. Port of New Haven. [accessed June 2024]. <https://www.newhavenct.gov/government/departments-divisions/port-authority/port-of-new-haven>.
- City of New Haven. 2024b. Terminals. [accessed June 2024]. <https://www.newhavenct.gov/government/departments-divisions/port-authority/terminals>.
- City of New Haven. 2024c. New Haven's History. [accessed 12 June 2024]. <https://www.newhavenct.gov/government/about-new-haven/new-haven-s-history>.
- Clark EM, Powers SL. 2002. *Connecticut in the American Revolution: An Exhibit from the Library and Museum Collections of The Society of Cincinnati*. [accessed 12 June 2024]. <https://www.americanrevolutioninstitute.org/wp-content/uploads/2018/09/Connecticut-in-the-American-Revolution-2001.pdf>.
- ConnecticutHistory.org. 2024. New Haven's Long Wharf. [accessed 12 June 2024]. <https://connecticuthistory.org/new-havens-long-wharf/>.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2023a. Critical Habitats. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/2126a00683e347bcb2ee28a75b24326b_0/explore.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2023b. Natural Diversity Database. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/58c6d263e85647caaa82c466d5794227_0/explore?location=41.494229%2C-72.756599%2C8.08.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2023c. Shellfish. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/fe5636b6c0d14d678ce17c721b868a51_0/explore.
- [CTDEEP] Connecticut Department of Energy & Environmental Protection. 2024a. Saltwater Fishing Resource Map. [accessed June 2024]. <https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=4ac9ffcad5e34971a13838bfaa7f5468>.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2024b. Migratory Waterfowl. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/c7b16aa915e94979b1fb65b4bc9f4e0a_0/explore?location=41.468343%2C-72.736568%2C8.62.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

[DECD] Connecticut Department of Economic and Community Development. 2023 October. Connecticut's Offshore Wind Strategic Roadmap. [accessed 25 June 2024]. <https://portal.ct.gov/offshorewind/-/media/offshorewind/state-of-connecticut-osw-strategic-roadmap-2023.pdf>.

[DECD] Connecticut Department of Economic and Community Development. 2024. Connecticut Cultural Resources Inventory System (ConnCRIS) [database]. [accessed 12 June 2024]. <https://portal.ct.gov/decd/services/historic-preservation>.

Eastern Connecticut Chamber of Commerce. 2021 Dec 22. *Embracing the Potential of Offshore Wind in Connecticut – A Study of Opportunities and Challenges*. Prepared by McAllister Marine Engineering, LLC. [accessed 25 June 2024]. https://chamberect.com/wp-content/uploads/2021/12/CT-OSW-Strategic-Study-Final-12.22.21_reduced1.pdf.

[EPA] U.S. Environmental Protection Agency. 2023a. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.

[EPA] U.S. Environmental Protection Agency. 2023b. General Conformity – De Minimis Tables. [updated 29 June 2023; accessed 11 May 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.

[EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Connecticut Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ct.html.

[EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.

Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.

Gateway Terminal. 2024. Terminal Overview. [accessed June 2024]. <https://gatewayt.com/gateway-terminal-overview>.

Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.

Google Maps. 2024. 41°17'32.50"N 72°54'27.77"W. Street View. [accessed 9 May 2024].

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

Newhaven Port and Properties. 2012. *Newhaven Port Masterplan 2012*. [accessed 23 July 2024]. https://www.newhavenport.com/images/documents/pmp_final_jan2012_part1.pdf.

[NOAA] National Oceanic and Atmospheric Administration. 2012. Nautical Chart No. 12371. 25th ed. Last correction October 28, 2023.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. Long Island Sound, 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated August 9, 2022; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/46646>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022c. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. [https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:::~:](https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:::)

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[NYSERDA] New York State Energy Research and Development Authority. 2017 December. *New York State Offshore Wind Master Plan Assessment of Ports and Infrastructure – Final Report*. Prepared by COWI North America, Inc.

Shelton J. 2010 July 18. Anchored in History: A look at boats of New Haven Harbor from 1638 to present [video]. New Haven Register. [accessed 12 June 2024]. <https://www.nhregister.com/news/article/Anchored-in-History-A-look-at-boats-of-New-Haven-11595323.php>.

S&P Global. 2024. Ports & Terminals Guide. [accessed 30 April 2024]. S&P Global Maritime Portal.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic

NEW HAVEN

Gateway Terminal in New Haven, Connecticut – 41°17'32.50"N, 72°54'27.77"W

Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for Connecticut. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed 7 June 2024]. <https://fred.stlouisfed.org/series/QTAXTOTALQTAXCAT3CTNO#0>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwspprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

BRIDGEPORT PORT PROFILE

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N,
73°10'30.07"W

Bureau of Ocean Energy Management

December 18, 2024



BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

1 Port Overview

Owner:	Barnum Landing LLC (Southeastern Connecticut Enterprise Region [SECTER] 2024)
Operator:	Barnum Landing LLC (SECTER 2024)
Primary Existing Uses:	Undeveloped
Primary Existing Cargo:	No Existing Cargo Operations
Existing Port Employment:	None
Typical Operating Hours:	Not applicable
Terminal Land Area:	18.5 acres (SECTER 2024)
Closest Wind Energy Lease Area:	South Fork Wind, LLC (OCS-A 0517)
Distance to Closest Lease Area:	115–135 nautical miles (SECTER 2024)
Potential Offshore Wind Port Uses:	Construction and Staging (New England Wind 2021)

Barnum Landing is a waterfront parcel located in Bridgeport, Connecticut, which includes approximately 18.5 acres of partially developed land, with over 9 acres available for lease to support offshore wind (SECTER 2024). There are no existing port operations occurring at the site; however, Southeastern Connecticut Enterprise Region (SECTER) reports that a ferry terminal is planned to be developed on the eastern half of the site (SECTER 2024). Additional information on the plans for the ferry terminal could not be found at the time of this report.

The Barnum Landing site includes two 400-linear-foot pile-supported wharves separated by a 200-foot gap (SECTER 2024). Existing quayside bearing capacity ranges from 250 to 400 pounds per square foot (psf), with an upland storage area bearing capacity of approximately 1,250 psf (SECTER 2024). The upland storage area has a surface of 12 to 18 inches of dense graded aggregate (DGA) and is roughly graded at a 2 percent slope (SECTER 2024). Existing berthing depths adjacent to the two wharves are 28 feet. The berths are adjacent to a federally maintained 400-foot turning basin which has an authorized project depth of 35 feet (National Oceanic and Atmospheric Administration [NOAA] 2014). The federally maintained entrance channel also has a project depth of 35 feet. There are no existing cranes or crane pads on-site (SECTER 2024). The Barnum Landing site is located about 2.5 miles away from interstate highway 95 (I-95) but has no existing rail service (SECTER 2024).

In May 2021, Vineyard Wind, a partnership between Avangrid, Inc. (Avangrid), and Copenhagen Infrastructure Partners, signed a lease to turn Barnum Landing into a construction and staging location for their 804-megawatt New England Wind project (formerly known as Park City Wind project) (New England Wind 2021). They also signed a lease for a space in downtown Bridgeport that will serve as their headquarters in Connecticut (New England Wind 2021). Due to zoning changes and market factors, Avangrid's project plans have experienced delays (Turmelle 2022); however, as of 2022 Avangrid remains committed to the project, which will include developing Barnum Landing for use during the construction phase of the New England Wind Project for storage and assembly of wind turbine components (Turmelle 2022). Following the construction phase, a 3-acre portion of the site would be developed to serve as an operations and maintenance (O&M) hub (Turmelle 2022).

In 2008, the New England District of the U.S. Army Corps of Engineers (USACE) performed maintenance dredging of the Bridgeport Harbor channel to return it to an acceptable depth for deep draft navigation (USACE 2010). Once this dredging was complete, the USACE did not expect additional dredging within a 20-year period (USACE 2010). The Port of Bridgeport, which includes the Barnum Landing site, is one of the few ports in New England with no air draft restrictions (SeaRates 2024).

Existing capabilities are summarized in Table 1-1.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	400 (NOAA 2014)
	Port Access Channel Controlling Depth (feet)	35 (NOAA 2014)
	Overhead / Air Draft Restriction (feet)	Unlimited (SeaRates 2024)
	Number of Berths	2
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	1.2–2
	Length (feet)	800+
	Depth (feet)	28
	Suitable for Spud-Jacking (Yes/No)	No
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	9 (available) 18.5 (total)
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Approx. 6.1
	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	1.3 (Google Earth 2024)
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	No
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	No cranes on-site
	Height Restrictions (Yes/No)	Unlimited
Transportation	On-Site Rail (Yes/No)	No
	On-Site Highway (Yes/No)	No (Google Earth 2024)

Source: SECTER (2024), unless otherwise noted.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for a proposed construction and assembly port is presented in Avangrid’s press release from October 11, 2019, *Park City Wind Will Transform Bridgeport into Offshore Wind Hub* (New England Wind 2019). Based on the concept depicted on this and several other publicly available press releases and news articles and the minimum port requirements for staging and marshalling ports provided in the National Renewable Energy Laboratory (NREL) report *The Demand for a Domestic Offshore Energy Supply Chain* (NREL 2022), proposed modifications have been developed. Note that the Park City Wind project has since been re-named New England Wind project.

Modifications required to support offshore wind as a construction and staging port include the following: berth (and potentially channel) deepening via dredging, quayside bearing capacity improvements (which would also include improvements related to the installation and use of a mobile crane on the wharves), upland storage area ground bearing capacity improvements, and modifications to existing access ways. Another minor modification depicted on the conceptual design includes the installation of landscaping improvement to improve the parcel aesthetics.

Modifications required to prepare the upland portion of the site, which covers approximately 16 acres, includes the placement and compaction of additional DGA on the existing ground surface. Per SECTER (2024), 12 to 18 inches of DGA has already been placed at the site, resulting in an approximate existing ground bearing capacity of 1,250 psf. Based on the proposed thickness of 3 feet of DGA for the Port of Albany concept (New York State Energy Research and Development Authority 2019), it is assumed that up to an additional 2 feet of DGA will need to be placed and compacted to achieve the recommended ground bearing capacity for a marshalling port of 3,000 to 4,000 psf (NREL 2022). Due to the presence of the existing DGA layer, it is assumed that compaction would be through vibratory compaction and potentially the placement of temporary surcharges of soil versus the construction of subsurface elements such as concrete columns, which is consistent with modifications proposed for other port build-out concepts (e.g., Searsport, Maine).

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Modifications required for quayside bearing capacity improvements are assumed to include the driving of additional steel pipe piles, and potentially the replacement of existing piles in addition to reinforcing the existing concrete deck platform with a layer of DGA in a manner consistent with the upland portion of the site, i.e., the placement and compaction of DGA via vibratory methods or placement of temporary surcharge loads. Based on the concept presented by Avangrid, it is assumed that no additional modifications would be required.

To provide access to the wharf, it is estimated that a 40-foot berthing depth is needed (SECTER 2024). Approximately 4 acres would be dredged. Based on existing depths, approximately 90,000 cubic yards of sediment would need to be dredged, dewatered, and disposed of, and water from the dredging dewatering operations would need treatment. As much as 101 acres of the existing, federally maintained Bridgeport entrance channel may also require dredging to meet a 40-foot depth requirement. The existing channel project depth is reported by NOAA as 35 feet (NOAA 2014). Although wind port staging and construction operations could occur using the channel with this depth, as much as 820,000 cubic yards of sediment could need to be removed in order to meet a 40-foot depth requirement (based on the length of the channel to reach existing water depths greater than 40 feet, per NOAA 2014). Similar to dredging operations assumed for berth deepening, dredging activities would include dredged material dewatering, stabilization, processing, and disposal, as well as water treatment.

Additional minor modifications depicted on the conceptual design include access way improvements to existing roads, primarily consisting of security improvements (e.g., fencing, gates, lighting and signage) and landscape features that presumed to be aesthetic in nature.

As noted, there are no air draft restrictions at the Barnum Landing site or related to the Bridgeport entrance channel.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling and berthing at the site, which would increase emissions; an increase in local terrestrial cargo transportation within the site and for employees and other off-site transportation activities (also increasing emissions); and associated worker activities on-site, such as moving and assembling components.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Fairfield County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Fairfield County, Connecticut, includes urban areas with a moderate to high population density and a sizable and diverse industrial base. Emission sources within the boundaries of Fairfield County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Fairfield County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, the burning of fossil fuels, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023a). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Fairfield County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	49	8	19	3	–
Biogenics*	540	65	–	–	–	7,274	476	–
Dust	–	–	–	3,070	452	–	–	–
Fires	11	–	–	1	1	3	1	197
Fuel Combustion	8,049	2,730	69	1,370	1,319	1,104	377	–
Industrial Processes[§]	–	–	–	–	–	384	19	–
Miscellaneous[†]	609	6	1	974	898	689	138	–
Mobile	68,309	5,462	26	676	361	4,678	1,424	4,259,286
Point-Sources	595	1,219	98	105	101	131	71	3,096,725
Total	79,113	9,482	194	6,245	3,140	14,282	2,509	7,356,208

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Source: EPA (2023a).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. Fairfield County is in nonattainment of the National Ambient Air Quality Standard for the 2008 and 2015 8-hour ozone, and maintenance for 1971 CO and 2006 PM_{2.5} standards (EPA 2024a). Therefore, the General Conformity Rule is applicable (EPA 2023b).

Fairfield County is currently classified as Severe 15 nonattainment for the 2008 8-hour ozone standard; therefore, NO_x will be evaluated as a precursor of O₃. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years. Ambient air quality monitors located in Fairfield County reported an O₃ design value of 80.0 parts per billion (ppb) on average for the 2019 to 2021 period, 80.0 ppb on average for the 2020 to 2022 period, and 82.0 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth-moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 2.5 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	3.50	6.69	0.01	0.27	0.17	0.17	–	1,390.51
Nonroad Emissions	1.93	6.05	0.01	0.35	0.31	0.30	0.17	2,854.66
On-Road Emissions	2.52	0.18	<0.01	0.03	0.38	0.09	0.01	259.50
Fugitive Dust	–	–	–	–	4.02	0.40	–	–
Total	7.95	12.92	0.02	0.65	4.88	0.96	0.18	4,504.67
Conformity De Minimis levels¹	100	25	–	25	–	100	N/A	N/A

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

¹ De Minimis levels for Severe 15 nonattainment for the 2015 8-hour ozone standard, and maintenance for CO and PM_{2.5}.

Air emissions from dredging expansion would not likely add appreciably to existing emissions and have been estimated to be less than the applicable conformity de minimis levels. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long-term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	182.26
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.13	0.01	<0.01	<0.01	0.02	<0.01	<0.01	13.52
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12
Total	0.73	0.63	<0.01	0.02	0.03	0.01	<0.01	250.84

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTPy = metric tons per year.

Area of Potential Air Quality Issues: For screening-level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the quayside bearing capacity improvement phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 46.6 kilometers. While the airshed is currently in nonattainment for the 2008 and 2015 8-hour ozone, and maintenance for 1971 CO and 2006 PM_{2.5} standards, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or O&M. These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric)

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The Bridgeport modification scenario area falls within the City of Bridgeport and includes myriad historic resources. Review of the confidential Connecticut Cultural Resources Information System (ConnCRIS) database and publicly available reference sources identified more than 2,800 historic aboveground and archaeological inventory points within the city (Department of Economic and Community Development [DECD] 2024; National Park Service [NPS] 2024). Inventory points consisted of archaeological sites and aboveground historic areas, buildings, and structures recorded as cultural resources at the local, state, and federal levels. There are 24 National Historic Districts in the City of Bridgeport (DEDC 2024; NPS 2024). In addition, there are 22 archaeological sites listed on the state Historic Resources Inventory for the City of Bridgeport (DECD 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structures of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area is in a commercial and industrial zone on the east side of Bridgeport Harbor at Barnum Landing and includes 15 acres of leveled, filled, and paved surface and temporary structures (New England Wind 2021). Based on available aerial imagery, four large structures were in use at Barnum Landing and an entryway building complex was at Seaview Avenue between 1991 and 2012. By 2012, the southernmost structure and the entryway complex were removed, and, of the three remaining structures, the middle was showing signs of roof collapse. Signs of structural deterioration continue, and by 2017 only the northernmost structure remained. Between 2022 and 2023, the remaining aboveground structure was removed from Barnum Landing.

There is limited visual screening from trees and other vegetation along the east side of the modification scenario area near Seaview Avenue, where a residential and commercial neighborhood is located. The modification scenario area is bounded on the north side by similar existing industrial development. To the west and south, the modification scenario area faces Bridgeport Harbor with no trees or vegetation screening (Google Earth 2024). Barnum Landing is across the harbor from the 485-megawatt Bridgeport Harbor Station #5 natural gas plant opened by PSE&G in July 2019 (Wind Power Analytics 2019).

Terrestrial Archaeological Resources: Terrestrial archaeological sites of Pre-Contact, Contact, Post-Contact, and Historic periods are known to occur in areas where older soils persist relatively undisturbed by historic and recent industrial or port developments, either onshore, along the seashore, or submerged near shore (BOEM 2021, 2023). There are 39 identified archaeological sites within a 3-mile radius, 12 of which are within 1 mile (DECD 2024). These include four sites consisting of Pre-Contact camp sites, a shell midden, and burials, in addition to one Post-Contact Euro-American dwelling site with an aboveground component (DEDC 2024).

Marine Archaeological Resources: Four submerged wrecks were identified within a 3-mile radius of Barnum Landing in confidential and publicly available sources (NOAA 2024a). These resources included three NRHP-listed wrecks and one NRHP-eligible wreck (DEDC 2024; NOAA 2024a).

Aboveground Historic Resources: Within a 3-mile radius, there are approximately 2,000 aboveground historic inventory points listed in the confidential ConnCRIS database (DECD 2024). These include resources eligible for or listed in the NRHP, as well as aboveground resources ineligible for the NRHP or with undetermined status (DECD 2024; NPS 2024). These inventory points are situated within Downtown Bridgeport, West End, Brooklawn/St. Vincent, North Bridgeport, and Stratford (Google Earth 2024). These historic resources consist of dwellings, structure, houses of worship, schools, municipal buildings, outbuildings, commercial or industrial buildings,

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

landscape elements, and other facilities determined to be significant cultural resources at the local, state, and federal levels (DECD 2024; NPS 2024).

Approximately 1,400 documented cultural resource inventory points are within 1 mile of Barnum Landing (DECD 2024; NPS 2024). These resources are centered in downtown Bridgeport and the South End and East End neighborhoods, and consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists with undetermined, eligible, or listed status on the NRHP (DECD 2024; NPS 2024). The historic property data indicates a relatively high frequency of aboveground historic resources. Of this group, three are listed on the NRHP (DECD 2024; NPS 2024).

There are at least 23 National Register Districts within a 3-mile radius (DECD 2024; NPS 2024). Fifteen of these districts are within 1 mile of the modification scenario area and collectively encompass over 900 contributing elements (DECD 2024; NPS 2024).

No aboveground historic resources are within the proposed port modification area. The structures formerly on-site were operated by Turbana Corporation, a tropical produce importer. Turbana was founded in 1970 to import Columbian bananas (Collen 2010; Computrabajo 2024). Headquartered in Florida and registered as a Connecticut corporation beginning in 1988, Turbana last occupied the Barnum Landing property in 2008, when it moved the operation to Philadelphia; by then, and since 2005, Turbana was merged under Fyffes North America (Connecticut Secretary of State Business Registration 2024; Fyffes 2024; Wind Power Analytics 2019). The vacant Barnum Landing property came under new management in 2019 (Wind Power Analytics 2019).

Cultural Resources Potential: Reviews of historic maps and aerial imagery through time within a 1-mile radius indicate the presence of multiple cultural resources and historic structures near Barnum Landing (Google Earth 2024). Historic buildings and structures surrounding the modification scenario area along Seaview Avenue to the east and to the west in Bridgeport Harbor, such as a NRHP-listed lighthouse, may relate to historic shipping, shipbuilding, and whaling activities of the nineteenth century (Historic Buildings of Connecticut 2024).

Terrestrial archaeological sites are of low to moderate potential in the proposed modification scenario area and surrounding areas but could occur adjacent in more deeply buried terrestrial deposits or in undisturbed natural areas (intact shoreline sediments within the harbor). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Due to the extensive grading, fill, and paving on the pier, port modifications would affect a limited amount of terrestrial soils or additional shoreline sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on confidential and publicly available sources (DECD 2024; NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in shore or harbor sediments that are largely undisturbed by previous dredging, excavation, or erosion. Port modifications could affect riverbank sediments that may be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction-

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

or operation-related interactions with equipment, noise (particularly high intensity noise such as piledriving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{5,16,18}	• Situated in Bridgeport Harbor in an existing port and industrialized area; surrounded by high density developed land, decreasing in density at approximately 3 miles. • Bridgeport Harbor flows into Long Island Sound approximately 1 mile from the port. • No terrestrial habitats found within the uplands. • A few isolated wetlands, ponds, and intermittent streams occur within 1 mile. Two large saltmarshes are present approximately 2 miles east of the site adjacent to a small airport. • Approximately 200 acres of local parks and public access areas within 1 mile.
Shoreline Habitats ⁸	• Within the modification scenario area, manmade/ armored and riprap are the predominant shoreline categories. • Shorelines within 1 mile to the north are also hard substrate, including rocky and riprap shorelines. • Shorelines to the south are a mixture of sand beaches, saltmarshes, and armored features; shorelines are more natural farther from Bridgeport Harbor proper; these include vegetated banks, tidal flats, and sand and gravel beaches.
Submerged Marine Habitats ^{3,13,14}	• Benthic substrate in Bridgeport Harbor is predominantly sand. • Oyster habitats identified within 1 mile from the modification scenario area; oyster habitat identified within 2 miles from the modification scenario area and into Long Island Sound. • No Submerged Aquatic Vegetation (SAV) identified within 3 miles.
Designated Habitats / Places ^{6,7,10,11,12,15,19}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies; and Consolidated Highly Migratory Species. • Habitat Areas of Particular Concern for Summer Flounder SAV within 3 miles. • Two Important Bird Areas are found within 3 miles, to the east of the modification scenario area. • Three Coastal Barrier Resources Areas are found within 1 to 3 miles to the east, south, and west of the modification scenario area: CT-18P, E08A, E07. • No Critical Habitat or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{9,17}	• Tricolored bat: potential forested habitat and flyways within 3 miles. • Roseate terns and rufa red knot: coastal habitats within 1 mile. • Piping plover coastal habitat within 1 mile. • Shortnose and Atlantic sturgeon may occur within 1 mile. • Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles ^{2,17}	• Bald eagles, golden eagles, and 38 species of migratory birds (some with state protections) have suitable habitat within 1 mile.
Marine Mammals ^{10,12}	• Harbor porpoises and Atlantic bottlenose dolphins likely present near modification scenario area.
State Specific Resources ^{1,2,3,4}	• Connecticut Critical Habitats are located within 1 mile to the east (Great Meadows – saltmarsh), and within 3 miles to the east (Frash Pond – marsh) and (Charles E Wheeler Wildlife Management Area – saltmarsh). • Natural Diversity Areas are found within and throughout the modification scenario area within 1 mile. • Migratory Waterfowl Concentration Areas occur within 1 mile of the modification scenario area (blackduck, bufflehead, gadwall, goldeye, mallard, green winged teal.)

Sources: ¹Connecticut Department of Energy and Environmental Protection (CTDEEP) 2023a; ²CTDEEP 2023b; ³CTDEEP 2023c; ⁴CTDEEP 2024a; ⁵Multi-Resolution Land Characteristics Consortium 2021; ⁶National Audubon Society 2024; ⁷NOAA 2021; ⁸NOAA 2022a; ⁹NOAA 2022b; ¹⁰NOAA 2023a; ¹¹NOAA 2023b; ¹²NOAA 2023c; ¹³U.S. Fish and Wildlife Services (USFWS) 2023a; ¹⁴USFWS 2023b; ¹⁵USFWS 2024; ¹⁶U.S. Geological Survey (USGS) 2022; ¹⁷USGS 2024.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition; dewatering	Sediment disturbance and temporary increase in turbidity from dredging, pile driving/drilling, and coffer dam dewatering.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	No terrestrial habitat within the existing port terminal. .
Onshore Aquatic Habitats	None	No onshore aquatic habitats within the existing port terminal.
Shoreline	None	No impacts to shoreline type are anticipated as modification scenario area is sited within an existing port terminal.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	Temporary loss of approximately 101 acres of benthic habitat and resources due to dredging to deepen and widen channel. Temporary loss of approximately 4 acres of benthic habitat due to dredging for new berth access.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving (impulsive) activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation. Temporary acoustic impacts due to pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances; however, acoustic impacts during operations would be consistent with surrounding existing land use.
Other Terrestrial Biota	Terrestrial noise	Impacts may occur due to construction and operations noise; however, acoustic impacts during operations would be consistent with surrounding existing land use.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

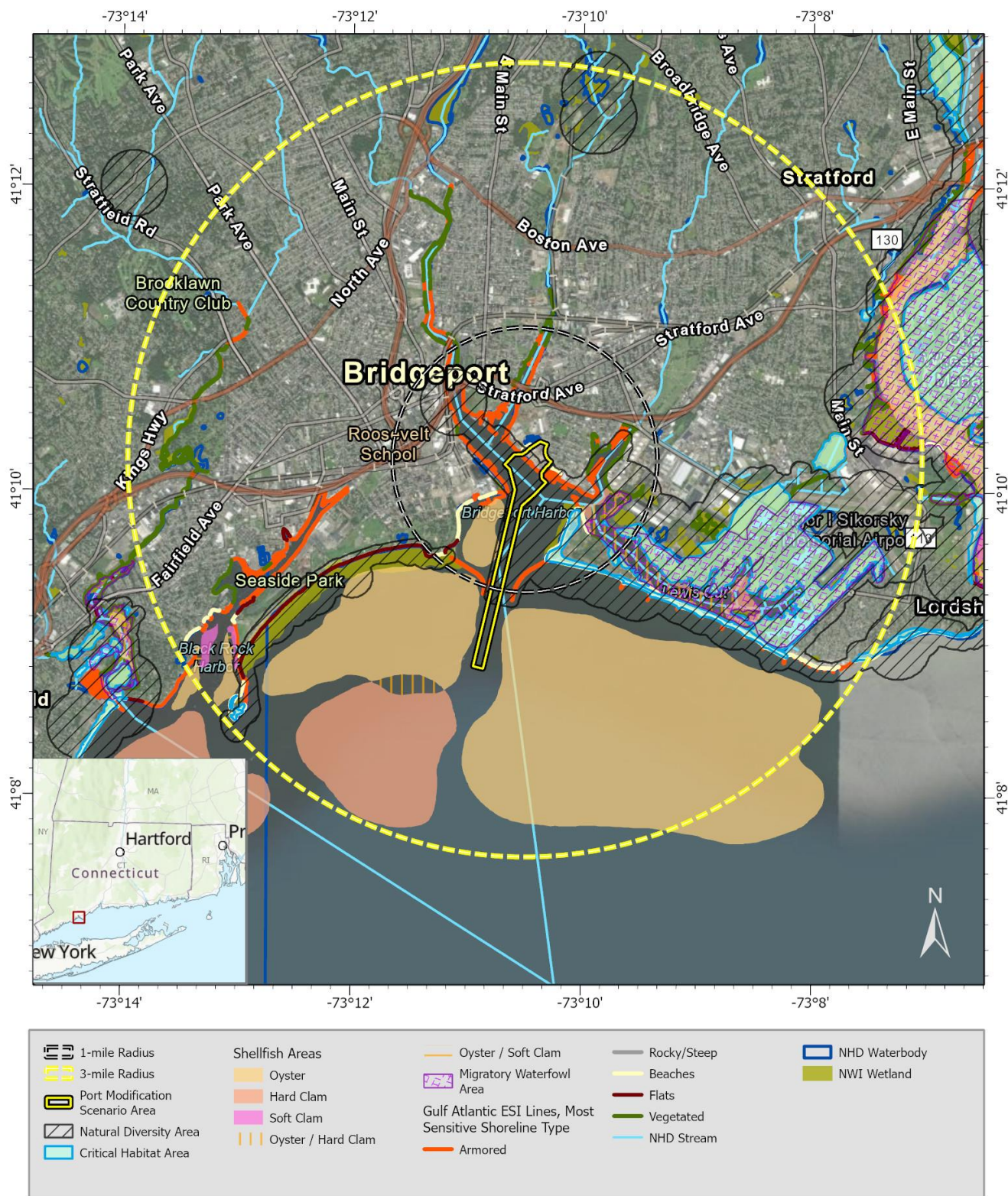


Figure 4-1. Existing habitats and natural resource areas.

Sources: CTDEEP 2023a, 2023b, 2023c, 2024b; NOAA 2024b; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Impact-causing elements of concern for potential adverse effects at the Barnum Landing site in Bridgeport include noise from pile driving and other construction activities and visual changes due to tall cranes. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

The presence of tall cranes may be viewed as degrading or improving visual resources depending on the opinion of the observer towards offshore wind development, the existing industrial development of shoreline areas, or general aesthetic preferences. Effective mitigating strategies for crane-related visual alterations may include:

- Meaningful public outreach that emphasizes community and environmental benefits of offshore wind.
- Painting to blend in with the surrounding viewscape.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	The land use in the modification scenario area is primarily industrial. Within a 5-mile radius of Barnum Landing, the land use is a mix of commercial, residential, and park spaces (Esri 2023).	None – terrestrial port modifications will be contained within site boundaries.	In the proposed port modification scenario, facilities would be contained within site boundaries and adjacent vacant properties and would not affect surrounding land uses.
Infrastructure	The Sikorsky Memorial Airport is located just east of Barnum Landing. I-95 is the nearest interstate and is less than 1 mile from the modification scenario area. Large highways within 5 miles include US 1, CT 113, CT 127, CT 8, CT 58, CT 59. Conrail PC Railroad is 1 mile from the modification scenario area (Esri 2023).	None – terrestrial port modifications will be contained within site boundaries.	In the proposed port modification scenario, facilities would be contained within site boundaries and adjacent vacant properties and would not affect existing infrastructure.
Special Use Areas	One military use area is located within 5 miles of the modification scenario area: the Stratford Army Engine Plant (ArcGIS Online 2020).	Traffic congestion.	There are no anticipated impacts on the Stratford Army Engine Plant.
Visual	The port property and equipment are visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes up to 250 feet tall during construction; lights and vessel activity during operation.	Activities during construction and operation and new facilities would be adjacent to residential, cultural, and recreational areas. Tall cranes may be visible from a large area.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise would reach the adjacent residential, commercial, and recreational areas.
Air Quality	The EPA reports 3 of 6 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Ozone, Diesel Particulate Matter, and Toxic Releases to Air are in the 97th, 63rd, and 57th percentile nationally, respectively. Asthma risk is in the 52nd percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the modification scenario area is in the 88th percentile nationally.	Project-related congestion.	Up to 370 and 115 additional personal vehicles per day during construction and operation, respectively, will be an immaterial addition to a city that employs nearly 80,000 and has robust surrounding traffic infrastructure.
Maritime Navigation	The nearest marine highway is the Long Island Sound route (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The impact during operation would be contingent upon the number of projects that use the port.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	Bridgeport Harbor is centered around tourism and transportation. The designated area for port development is not currently used for commercial shipping. There are plans to develop a ferry terminal next to the modification scenario area. Local roads link the port directly to Interstate 95.	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Dredging and port calls may interfere with Ferry terminal development and use.
Commercial Fishing	Bridgeport is not a "Top U.S." commercial fishing port (NOAA 2022c). Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	There are various public access points and popular shore and boat fishing sites within 1 mile of the modification scenario area. Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area overlaps with regions of popular recreational fishing use, though the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	Within 5 miles of the modification scenario area, there are parks/protected areas, including city and state park land, beaches, state resource management areas, wildlife refuges, and state and federal marine protected areas (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions will reach nearby recreational areas and boaters. Tall cranes would be visible from recreational areas.
Tourism	37,656 persons (7.7% of employed persons) within the MSA are employed in "arts, entertainment, recreation, accommodations, and food services" (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Potential degradation of view and soundscapes.
Housing and Lodging	5,348 of the 23,426 vacant housing units in the county are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 251,137 within 5 miles of the modification scenario area and is relatively low density. The population within the MSA is 963,211 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The up to 370 workers during construction and 115 during operation would not materially increase MSA population. The creation of new jobs could potentially draw workers to the MSA; the effect would be immaterial to a 963,211-person population.
Labor Force and Employment	The civilian labor force of the MSA is 520,194 and employment is 487,845. The unemployment rate is 6.2% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 370 workers during construction and 115 during operation would not materially increase the labor force or decrease unemployment.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Income Levels	The per-capita income is \$38,424 within 5 miles of the modification scenario area and is \$66,513 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of up to 370 workers during construction and 115 during operation at prevailing wage levels would not materially alter income levels. The jobs created in a 520,194-person labor force with 6.2% unemployment are not likely to result in a measurable increase in income levels.
Community Cohesion	The community cohesion indices reveal that the three nearest counties rank at the 11th, 15th, and 38th percentiles, respectively. Meanwhile, the county where the port is situated is at the 17th percentile, demonstrating below-average community cohesion across all four areas (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. There are divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Connecticut was \$23.1 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports four hospitals and 68 schools are within 5 miles of the port. Nearly 23% of the MSA population is employed in "educational, health care, and social services" (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively minor as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2021. *South Fork Wind Farm and South Fork Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM 2020-057. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. [accessed June 2024]. <https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/SFWF%20FEIS.pdf>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Collen C. 2010 Sept 30. Turbana Celebrates Turning 40. [accessed 10 July 2024]. <https://www.fruitnet.com/eurofruit/turbana-celebrates-turning-40/8316.article>.
- Computrabajo. 2024. C.I unibán s.a. [accessed 10 July 2024]. <https://co.computrabajo.com/empresas/acerca-de-ci-uniban-sa-ED230E4AD5E5A6CF>.
- Connecticut Secretary of State Business Registration. 2024. Turbana Corporation. [accessed 10 July 2024]. <https://www.bizapedia.com/ct/turbana-corporation.html>.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2023a. Critical Habitats. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/2126a00683e347bcb2ee28a75b24326b_0/explore.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2023b. Natural Diversity Database. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/58c6d263e85647caaa82c466d5794227_0/explore?location=41.494229%2C-72.756599%2C8.08.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2023c. Shellfish. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/fe5636b6c0d14d678ce17c721b868a51_0/explore.
- [CTDEEP] Connecticut Department of Energy & Environmental Protection. 2024b. Saltwater Fishing Resource Map. [accessed June 2024]. <https://ctdeep.maps.arcgis.com/apps/webappviewer/index.html?id=4ac9ffcad5e34971a13838bfaa7f5468>.
- [CTDEEP] Connecticut Department of Energy and Environmental Protection. 2024b. Migratory Waterfowl. [accessed 6 May 2024]. https://geodata.ct.gov/datasets/c7b16aa915e94979b1fb65b4bc9f4e0a_0/explore?location=41.468343%2C-72.736568%2C8.62.
- [DECD] Connecticut Department of Economic and Community Development. 2024. Connecticut Cultural Resources Inventory System (ConnCRIS) [database]. [accessed 12 June 2024]. <https://portal.ct.gov/decd/services/historic-preservation>.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

[EPA] U.S. Environmental Protection Agency. 2023a. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.

[EPA] U.S. Environmental Protection Agency. 2023b. General Conformity – De Minimis Tables. [updated 29 June 2023; accessed 11 May 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.

[EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Connecticut Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ct.html.

[EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.

Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.

Fyffes. 2024. Our Story. [accessed 10 July 2024]. <https://www.fyffes.com/our-story/our-history/>.

Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.

Google Maps. 2024. 41°10'12.48"N, 73°10'30.07"W. Street View. [accessed 9 July 2024].

Historic Buildings of Connecticut. 2024. The Tongue Point Lighthouse. [accessed 22 August 2024]. <https://historicbuildingsct.com/tongue-point-lighthouse-1895/>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

New England Wind. 2019. Park City Wind Will Transform Bridgeport into Offshore Wind Hub. [accessed June 2024]. <https://www.parkcitywind.com/announcements?offset=1626720000809&tag=Press+Release>.

New England Wind. 2021. *Vineyard Wind Announces Connecticut Headquarters, Signs Lease for Construction and Staging at Barnum Landing*. [accessed June 2024]. <https://www.parkcitywind.com/announcements/barnum-landing>.

New York State Energy Research and Development Authority. 2019 January. *2018 Ports Assessment: Port of Albany-Rensselaer - Pre-front End Engineering Design Report*. Final Report.

[NOAA] National Oceanic and Atmospheric Administration. 2014. Navigation Chart No. 12369. 27th ed. Last correction 6 December 2023.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

[NOAA] National Oceanic and Atmospheric Administration. 2022b. NY/NJ Metro Area, Hudson River, and South Long Island 2016 ESI (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 9 August 2022; accessed 14 May 2024]. <https://www.fisheries.noaa.gov/inport/item/50664>.

[NOAA] National Oceanic and Atmospheric Administration. 2022c. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. <https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:>

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[NREL] National Renewable Energy Laboratory. 2022 June. *The Demand for a Domestic Offshore Wind Energy Supply Chain*. [accessed June 2024]. <https://www.nrel.gov/docs/fy22osti/81602.pdf>.

SeaRates. 2024. Bridgeport Port, United States. [accessed July 2024]. https://www.searates.com/port/bridgeport_us.

[SECTER] Southeastern Connecticut Enterprise Region. 2024. Barnum Landing. [accessed 23 July 2024]. <https://www.secter.org/wind-projects/barnum-landing/>.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

Turmelle L. 2022 Nov 3. Avangrid Officials: Company Still Committed to Park City Wind Project Despite Pushing Back Completion. CT Insider. [accessed 23 July 2024]. <https://www.ctinsider.com/business/article/Avangrid-reaffirms-Bridgeport-plans-amid-delays-17552928.php>.

[USACE] U.S. Army Corps of Engineers. 2010. *Bridgeport Harbor, Connecticut Dredged Material Management Plan*. [accessed 23 July 2024]. <https://www.nae.usace.army.mil/Portals/74/docs/Topics/BridgeportDMMP/DraftDMMP.pdf>.

BRIDGEPORT

Barnum Landing Terminal in Bridgeport, Connecticut – 41°10'12.48"N, 73°10'30.07"W

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024].

<https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for Connecticut. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed 7 June 2024].

<https://fred.stlouisfed.org/series/QTAXTOTALQTAXCAT3CTNO#0>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwspprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

Wind Power Analytics. 2019. Offshore Wind Developer Focusing on Bridgeport's Underused Waterfront. [accessed 10 July 2024]. <https://wind.substack.com/p/offshore-wind-developer-focusing>.

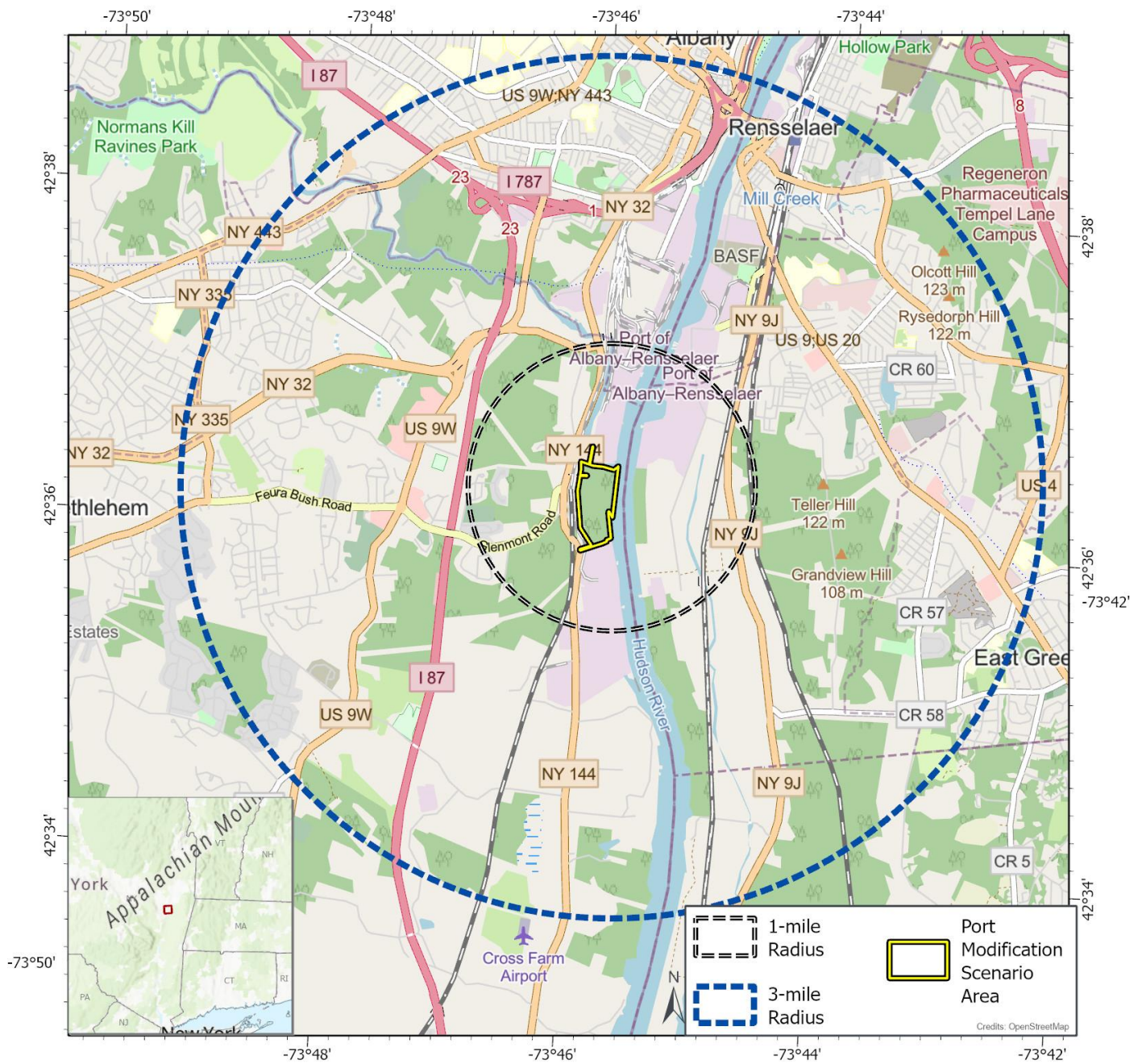
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

ALBANY PORT PROFILE

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Bureau of Ocean Energy Management

December 18, 2024



ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

1 Port Overview

Owner:	Albany Port District Commission (APDC) (2019a)
Operator:	Logistec Terminals Inc. (Port of Albany 2024a)
Primary Existing Uses:	Commercial cargo (Rensselaer County Regional Chamber of Commerce [RCRCC] 2024)
Primary Existing Cargo:	Break bulk, heavy lift cargo, forest products, scrap iron, molasses, onshore wind energy components (RCRCC 2024)
Existing Port Employment:	Approximately 1,400 local jobs (Port of Albany 2024b)
Typical Operating Hours:	8:30 a.m. to 5 p.m. (Port of Albany 2024a)
Terminal Land Area:	400 acres (RCRCC 2024)
Closest Wind Energy Lease Area:	Equinor Empire Wind Offshore Wind Farm
Distance to Closest Lease Area:	Approximately 194 nautical miles
Potential Offshore Wind Port Uses:	Manufacturing and tower assembly

The Port of Albany is the largest inland port in the northeastern United States, covering approximately 400 acres on both sides of the Hudson River across three municipalities—Albany, Rensselaer, and Bethlehem, New York (RCRCC 2024). The port is approximately 124 nautical miles north of the Port of New York, and is accessed via the Hudson River federal navigation channel, which has a limiting depth of 32 feet, referenced to mean lower low water (APDC 2019a). The Port of Albany is height-restricted by the Mid-Hudson Bridge, located between Poughkeepsie and Highland, New York, with a clearance height of 134 feet, referenced to mean higher high water (New York State Energy Research and Development Authority [NYSERDA] 2019).

Existing commercial uses at the port include light and heavy cargo, including onshore wind energy components (Logistec Terminals Inc. 2024). Across the three municipalities, the port includes 5,900 linear feet of deep-water berths (32 feet), 20 acres of upland open storage, and a combined 360,000 square feet of covered storage (Port of Albany 2024a). The port has two mobile cranes with up to 127 tons of lifting capacity, and a combined lifting capacity of up to 248 tons (APDC 2019a). The cranes operate on heavy lift wharves that have on-dock rail and there is a roll-on/roll-off ramp with 1,600 pounds-per-square foot load capacity (Port of Albany 2024a).

The Port of Albany is managed by the APDC, and operated by Logistec Terminals Inc. It is located near the intersection of two major interstates (I-90 and I-87). 72 vessels made calls at the port in 2018 (the latest information that could be obtained) with over 327,000 tons of cargo managed (APDC 2019a), resulting in over \$6,000,000 in total operating revenue (APDC 2019b).

In March 2021, the APDC entered into a funding agreement with Empire Offshore Wind LLC for pre-development activities and site preparation for an approximately 80-acre site on Beacon Island, located on the west side of the Hudson, south of the existing Port of Albany (APDC 2023). The site is proposed for development as a wind component manufacturing site and assembly port and would deliver up to 150 tower sections per year to a secondary assembly and integration port (e.g., South Brooklyn Marine Terminal) or directly to offshore wind farms (Karp Strategies 2023).

The site proposed for development on Beacon Island is located in Bethlehem, New York, and 2,500 linear feet of waterfrontage, approximately 70 acres of upland area and another approximately 8 acres of land below mean higher high water (NYSERDA 2019). The upland parcel is described as “relatively planar, undeveloped ... and consist[ing] of several wetland acres” (NYSERDA 2019).

Existing capabilities are summarized in Table 1-1.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	600 (APDC 2019a)
	Port Access Channel Controlling Depth (feet)	32 (APDC 2019a)
	Overhead / Air Draft Restriction (feet)	134 (NYSERDA 2019)
	Number of Berths	7
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	4.8–9.8
	Length (feet)	5,900
	Depth (feet)	32
	Suitable for Spud-Jacking (Yes/No)	No
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	20
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Information not available
	Haul Route Area Bearing Capacity (mt/m ²)	Information not available
	Approx. Size of Covered Storage Area (acres)	8.3
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	Yes
	Width of Ro/Ro Berth (feet)	60
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	7.8
Cranes	Lifting Capacity (mt)	225 (combined)
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	Yes

Source: Port of Albany (2024a), unless otherwise noted.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for the Albany manufacturing and assembly port is presented in the *2018 Ports Assessment: Port of Albany-Rensselaer* prepared by NYSERDA (2019). Recent developments have stalled additional funding for the design site preparation (Times Union 2024). If funding is obtained, construction of the wind port is estimated to take up to 3 years (NYSERDA 2019).

Planned modifications required to support offshore wind, as a construction and tower assembly port, include the following: clearing and grubbing approximately 69 acres of the site, site grading, ground improvements to increase the load bearing capacities, shoreline stabilization, dredging, and construction of a pile-supported heavy load wharf (NYSERDA 2019).

Planned modifications required to prepare the upland portion of the site, covering approximately 69 acres, include clearing and grubbing and grading to achieve a level ground surface. It was estimated that approximately 134,000 cubic yards of fill would require hauling and placement. Ground improvements to increase bearing capacity would include the installation of vertical concrete columns and soil compaction via dynamic compaction (NYSERDA 2019). Additional ground improvements would be made to stabilize the existing shoreline around the wharf. Shoreline stabilization measures would include the driving of steel pipe piles along 1,200 feet of the shoreline. The targeted ground bearing capacity for the upland areas is 3,000 psf, with a heavy lift area at the wharf with a bearing capacity of 6,000 psf. The surface treatment would include the placement and compaction of 3 feet of crushed stone across the site (NYSERDA 2019).

Modifications required for wharf construction include the driving of steel pipe piles to support a reinforced concrete deck platform that would be 1,310 feet in length and 65 feet wide. A steel sheet pile bulkhead would be driven at the face of the wharf, and a stone revetment slope would be constructed under the wharf to provide scour protection. The wharf would have a target live load bearing capacity of 6,000 psf (NYSERDA 2019).

To provide access to the wharf, approximately 213,000 cubic yards of dredging would be required in a 1,550-foot-long footprint that would connect the wharf to the existing Hudson River federal navigation channel at a depth of

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

33.8 feet (NYSERDA 2019). Dredging activities would include dredged material dewatering, stabilization, processing and disposal, and water treatment.

As noted, the port is air-draft restricted by the Mid-Hudson bridge, which would limit operations by reducing the available transport height unless some components are transported horizontally.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (i.e., new ship traffic related to OSW activities would represent an increase in emissions), an increase in local terrestrial cargo transportation (i.e., cargo and storage operations for wind turbine components), and associated worker activities.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Albany County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Albany County, New York, includes urban areas with a moderate population density and a sizable industrial base. Emission sources within the boundaries of Albany County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Albany County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2–1. Emissions Inventory in Tons per Year for Albany County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	369	74	10	4	–
Biogenics*	570	131	–	–	–	4,957	476	–
Dust	–	–	–	2,726	360	–	–	–
Fires	106	2	1	11	10	25	5	1,581
Fuel Combustion	4,370	951	57	708	692	617	229	–
Industrial Processes§	–	–	–	1,046	131	115	6	–
Miscellaneous†	3,790	95	37	775	709	2,262	324	–
Mobile	15,982	2,576	10	220	118	1,064	316	1,625,781
Point-Sources	1,760	1,434	237	448	306	444	157	3,493,509
Total	26,579	5,192	341	6,303	2,398	9,686	1,517	8,614,379

Source: EPA (2023).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = hazardous air pollutants; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes include various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Albany County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Albany County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years. Ambient air quality monitors located in Albany

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

County reported an O₃ design value of 57.0 parts per billion (ppb) on average for the 2019 to 2021 period, 57.7 ppb on average for the 2020 to 2022 period, and 62.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 1,600-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following assumptions:

- Use of ultra-low sulfur fuel in mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- Workdays of 10 hours/day, 316 days/year.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	3.14	10.34	0.01	0.24	0.16	0.15	–	1,249.44
Nonroad Emissions	5.97	16.85	0.03	1.04	0.99	0.96	0.51	8,670.35
On-Road Emissions	2.97	0.22	<0.01	0.04	0.44	0.11	0.01	305.34
Fugitive Dust	–	–	–	–	2.25	0.22	–	–
Total	12.08	27.41	0.04	1.32	3.84	1.44	0.52	10,225.13

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.59	0.54	<0.01	0.02	0.01	0.01	–	198.57
Nonroad Emissions	0.22	0.58	<0.01	0.04	0.03	0.03	0.02	247.64
On-Road Emissions	0.27	0.02	<0.01	<0.01	0.04	0.01	<0.01	28.16
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.13
Total	1.08	1.14	<0.01	0.06	0.08	0.05	0.02	474.50

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the construction phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 19.5 kilometers. While the airshed is currently in attainment or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions during construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by potential port modifications consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials are made to the building, structure, or associated site features (e.g., on-site facilities or landscaping) occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of an historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affects integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features within the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Identified Cultural Resources: The modification scenario area is located south of the city of Albany, in the town of Bethlehem, New York, on the Hudson River, and includes myriad historic resources (APDC 2024a). Review of the confidential New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) Cultural Resource Information System (NYSCRIS) database and publicly available reference sources identified more than 2,200 previously documented cultural resource inventory points within a 3-mile radius surrounding the modification scenario area. These inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal levels (National Park Service [NPS] 2024; OPRHP 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area is known as Beacon Island and was the site of rail lines that transported coal to the adjacent PSEG Bethlehem Energy Center power plant to the north. The site was also used as a coal ash disposal area from 1952 to 1970; it does not contain buildings in available aerial imagery or street views and no historic areas, buildings, or structures were identified within it (APDC 2024b; Google Earth 2024; McIntyre 2021; OPRHP 2024; Rulison 2022). Based on recent aerial imagery, there are two remaining rail lines within the modification scenario area as well as power transmission lines on the western edge of the property (Google Earth 2024). The modification scenario area is situated adjacent to a residential neighborhood with visual screening offered by the westernmost rail line, fence lines, existing mature tree lines and other vegetation. There is minimal and discontinuous vegetation on the Hudson River side of the modification scenario area facing the east bank of the river, and it has recently been cleared and graded or otherwise leveled (APDC 2024b; Google Earth 2024; Rulison 2022). Additional port facilities are located to the north of this area, across the Normans Kill inlet and to the northeast on the opposite bank of the Hudson River (Google Earth 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological sites of Pre-Contact, Contact, and Post-Contact and Historic period affiliation are known to occur within 1 mile of the modification scenario area and were identified from confidential and publicly available resources (Curtin 2003; Funk 1966, 1991, 1993; Lavin et al. 1996; NPS 2024; OPRHP 2024; Salwen 1978). At least 156 Native American archaeological sites were identified within 3 miles of the modification scenario location, encompassing portions of Albany, Bethlehem, Glenmont, Sherwood Park, and East Greenbush, New York (OPRHP 2024). This quantity of archaeological site data indicates an area of moderate to high frequency for archaeological resources.

Twenty-one Native American and Historic archaeological sites were identified in the confidential NYSCRIS database within a 1-mile radius and consist of campsites, village sites, lithic scatters, middens, multi-component sites, and isolated find spots (OPRHP 2024). Eighteen of these identified archaeological resources are NRHP-eligible or of undetermined NRHP status (OPRHP 2024). Older soils may persist undisturbed by historic railway or building construction and existing harbor developments. One National Register Archaeological District is located less than 0.5 miles from the modification scenario area and is an NRHP-listed cultural resource documenting the culture and lifeways of the Mohicans and early contact with Dutch explorers.

Marine Archaeological Resources: As many as 300 shipwrecks are known to exist within the Hudson River between Albany and New York City (National Oceanic and Atmospheric Administration [NOAA] 2024a). Two submerged wrecks were identified within a 3-mile radius and no wrecks were identified within a 1-mile study radius. (NOAA 2024a). These resources were of uncertain age and undetermined NRHP eligibility. These resources were of uncertain age and undetermined NRHP eligibility.

Aboveground Historic Resources: Within a 3-mile radius, there are 2,074 aboveground inventory points listed in the confidential and publicly available NYSCRIS database (NPS 2024; OPRHP 2024). These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, foundries), and municipal facilities. Of these resources, 1,123 are eligible for or listed on the NRHP, with the remaining 951 aboveground cultural resources not eligible for the NRHP or with undetermined status (NPS 2024; OPRHP 2024).

Fourteen previously documented cultural resource inventory points are located within 1 mile of the modification scenario area (OPRHP 2024). These resources consist of aboveground historic areas, buildings, structures, or objects

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

inventoried on local, state, or federal lists (NPS 2024; OPRHP 2024). Of these resources, six are considered not eligible for the NRHP or of undetermined eligibility status (NPS 2024; OPRHP 2024).

There are four National Register Historic Districts within a 3-mile radius; three of these districts are located in the City of Albany and one is located to the south of the modification scenario area on the east bank of the Hudson River (NPS 2024; OPRHP 2024). There are no National Register Historic Districts located within a 1-mile radius (NPS 2024; OPRHP 2024).

Cultural Resources Potential: Review of publicly available aerial imagery and historic topographic maps for a 1-mile radius indicates the presence of multiple cultural resources and historic structures (Google Earth 2024). Many of the historic areas, buildings, and structures found on these maps relate to the emergence of Albany as a settlement zone for Native American groups prior to 1600 A.D., and as an historic center for global shipping during the eighteenth and nineteenth centuries (APDC 2024a).

Unknown terrestrial archaeological sites are of moderate to high potential in the modification scenario area or surrounding areas and could also occur adjacent in more deeply buried terrestrial and shoreline deposits or in undisturbed natural areas (intact shoreline sediments or under former areas of coal ash fill). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Port modifications could affect terrestrial soils as well as additional shoreline or riverbed sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in riverbed or shore sediments that are largely undisturbed by previous dredging, excavation, or erosion; potential port modifications could affect these shoreline sediments and the riverbed.

Multiple aboveground cultural resources were identified within a 1-mile radius and would be at risk of potential physical impacts from port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the port modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as piledriving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the port. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,11, 15,17}	- Situated on a cleared parcel for potential industrial use, on the west bank of the Hudson River. Previous land use data and other resources indicate forested and emergent wetlands had been present; current imagery indicates the parcel has been cleared. - To the west is a mix of medium density residential areas and mixed forest. - Normans Kill borders the modification scenario area to the north, with perennial streams to the west. - Isolated and larger tract wetlands as well as perennial streams are found within 3 miles.
Shoreline Habitats ⁵	- Within the modification scenario area, shoreline is characterized as vegetated banks and swamp. - The banks of the Normans Kill to the north is primarily vegetated bank, and the shoreline of the Hudson to the north transitions from vegetated bank to armored and rocky shores. - Opposite the port, the banks of the Hudson are characterized by vegetated banks with areas of riprap and armoring offshore.
Submerged Marine Habitats ¹³	- Benthic substrate within the Hudson is muddy sand along the bank, transitioning to gravel pockets and sand within the maintained channel. - Substrate within the adjacent Normans Kill is primarily sand and mud.
Designated Habitats/Places ^{2,3,4,6,14,20,22}	- Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies. - Habitat Area of Particular Concern: Summer Flounder SAV. - Within Critical Habitat for the Atlantic sturgeon: New York Bight Unit 3: Hudson River. - No Important Bird Areas, Coastal Barrier Resource Area, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{4,16}	- Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. - Shortnose and Atlantic sturgeon may occur within 1 mile.
Migratory Birds and Eagles ¹⁶	Bald eagles and golden eagles, along with 12 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals ⁴	No anticipated occurrence of marine mammals.
State Specific Resources ^{7,8,9,10,13}	- County-level recreational areas and easements between 1 and 3 miles distance from the port. - Forest area to the west of the modification scenario area scores in the top 19% of Hudson Valley Forest for conservation interest, and within the top 1% for species richness. - The Hudson River at the port is characterized as a Significant Biodiversity Area. - Due to recent clearing, Natural Heritage Important Areas for aquatics, diadromous fishes, terrestrial areas, natural communities, and plants occur within adjacent parcels. - Normans Kill is considered Significant Coastal Fish and Wildlife Habitat.

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021; ²National Audubon Society 2024; ³National Oceanic and Atmospheric Administration (NOAA) 2021; ⁴NOAA 2022a; ⁵NOAA 2022b; ⁶NOAA 2023; ⁷New York Department of Environmental Conservation (NYDEC) 2019; ⁸NYDEC 2021; ⁹NYDEC 2022a; ¹⁰NYDEC 2022b; ¹¹NYDEC 2023; ¹²NYDEC 2024; ¹³New York Department of State 2023; ¹⁴U.S. Fish and Wildlife Service (USFWS) 2023a; ¹⁵USFWS 2023b; ¹⁶USFWS 2024; ¹⁷U.S. Geological Survey (USGS) 2022; ¹⁸USGS 2024.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

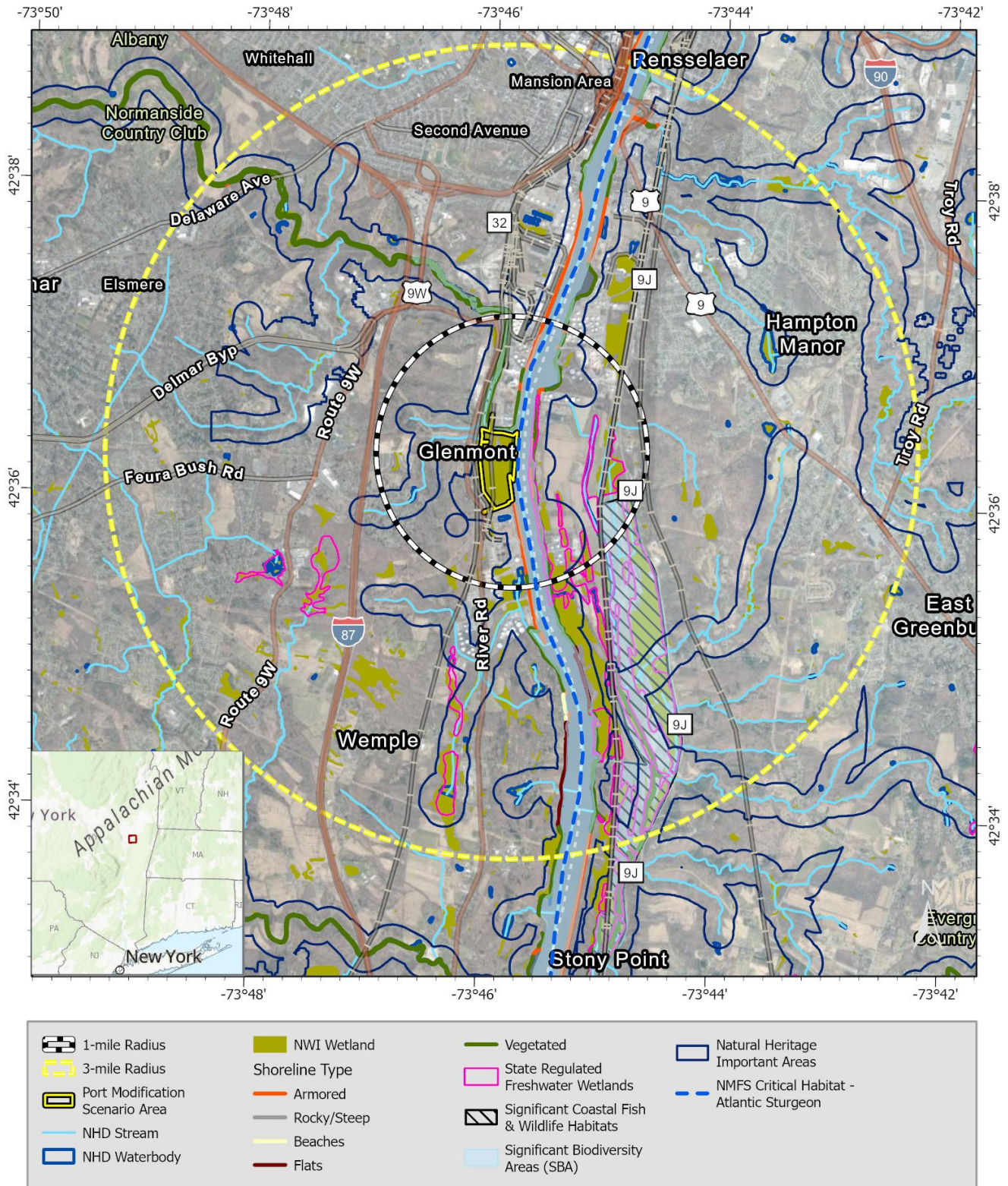


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2023, 2024b; NYDEC 2021, 2022b, 2023, 2024; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects on Ecological Resources
Water Quality	Sediment suspension and deposition; soil disturbance/erosion dewatering	• Sediment disturbance and temporary increase in turbidity due to ~5 acres of channel dredging. • Sediment disturbance and temporary increase in turbidity for aggregate dumping, fill placement, and pile driving/drilling activities associated with new berth.
Sediment Quality	None	• No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	• Minor clearing and conversion of fringe forested habitat due to clearing for fill excavation, infrastructure/laydown areas, roads, and rail lines. The majority of parcel has been previously cleared. Alteration area surrounded by industrialized land use.
Onshore Aquatic Habitats	Aquatic habitat alteration	• Majority of wetland habitats have already been cleared; Potential permanent impacts to fringe wetlands that may remain.
Shoreline	Habitat alteration	• Permanent loss of natural shoreline adjacent to dredge footprint, including vegetated banks and swamp.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	• Permanent loss of ~5 acres of riverine habitat and resources for new berth construction and channel widening/deepening. • Injury and mortality of benthic community and displacement of mobile organisms in path of dredging and adjacent sediment deposition. • Habitat loss is inclusive of essential fish habitat, Habitat Area of Particular Concern for Summer Flounder, and critical habitat for Endangered Species Act (ESA)–listed species.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	• Temporary acoustic impacts from construction vessel operation and pile driving (impulsive) activities leading to temporary behavioral changes. • Increased risk of injury or mortality due to vessel/equipment interaction. • ESA-listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	None	• No presence of marine mammals anticipated.
Sea Turtles	None	• No presence of sea turtles anticipated.
Birds and Bats	Terrestrial noise	• ESA-listed species, along with bald eagles and migratory birds, some with state protections, within 1 mile are at risk from temporary acoustic disturbances.
Other Terrestrial Biota	Terrestrial noise	• Impacts from construction and operations noise may occur in adjacent Significant Biodiversity Area and area of high conservation interest within 1 mile.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, “Port Overview.”

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Impact-causing elements of concern for potential socioeconomic impacts include pile driving–related noise during construction, traffic increases and congestion during operation, and potential housing and lodging challenges during operation.

The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

The influx of up to 4,400 workers during operation is expected to increase local road traffic and may lead to congestion during peak commuting hours. This could result in longer commute times, increased carbon emissions, and potential disruptions to local transit systems. Potential mitigation strategies include:

- The development of traffic management plans that include carpooling incentives, shuttle services, and enhanced public transit options to reduce the number of vehicles on the road.
- Staggered work hours for the project workforce to reduce peak hour traffic volume.
- Work closely with local traffic authorities to optimize traffic signals and possibly adjust traffic patterns to accommodate increased traffic flows without disrupting local communities.

The additional of up to 4,400 workers during operations would put upward pressure on housing costs and rental rates in the months following the initiation of port operation.

- Engage with local communities to address concerns related to housing and integrate community feedback into housing strategy planning to ensure the needs of both workers and local residents are considered.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the port is primarily mixed commercial and residential with interspersed forest cover; industrial uses immediately adjacent to the port. Port modification to occur on a cleared, but currently unused parcel (Esri 2023).	None – terrestrial port modifications will be contained within vacant, cleared parcel.	In the proposed port modification scenario, facilities would be contained within vacant, cleared parcels and would not affect surrounding land uses.
Infrastructure	I-87 and I-90 are the nearest interstates and are within 1 and 5 miles of the port, respectively. Large highways within 5 miles of the port include NY 144, US 9W, US 4, US 20, and NY 9J (Esri 2023).	None – terrestrial port modifications will be contained within vacant, cleared parcel.	In the proposed port modification scenario, facilities would be contained within vacant, cleared parcels and would not affect existing infrastructure.
Special Use Areas	None present within 5 miles (ArcGIS Online 2020).	None – Special use areas would not be affected.	No special use areas were identified within 5 miles of the proposed port modification scenario.
Visual	The port property is directly visible from nearby residential and recreational areas adjacent to the port (Google Maps 2024).	Cranes up to 250 feet tall during construction; mobile cranes up to 200 feet high, assembled units, lights and vessel activity during operation.	Operational lighting and assembled units may be visible from nearby residential areas. Tall cranes may be widely visible but are generally consistent with the existing viewshed.
Noise	Noise levels are moderate to high within 5 miles of the port, ranging from 45 decibels to 79.9 decibels. The highest levels are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2024).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. During operation general operational noise would reach the adjacent residential and recreational areas.
Air Quality	The EPA reports 1 of 6 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Diesel Particulate Matter is in the 51st percentile nationally. Asthma risk is in the 77th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The port modifications are likely to bring about a net reduction in global greenhouse gas emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 74th percentile nationally.	Project-related congestion.	Up to 100 additional personal vehicles per day during construction. During operation, the traffic associated with the creation of up to 4,400 jobs would be added in a port that currently employs 1,400 (Port of Albany 2024b).
Maritime Navigation	The nearest marine highways include the Hudson River, Erie Canal, and Champlain Canal routes (USDOT 2018).	Increased maritime traffic. Up to 50 additional calls during construction and 65 during operation.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	The port focuses on scrap iron, molasses, fertilizer, grain, scrap iron, heavy lift/project cargo, wood pulp, and calcium chloride. Rail and road transportation facilities exist within the business park. There were 72 port calls in 2023 (Port of Albany 2024b).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. The sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	The Port of Albany-Rensselaer is not a commercial fishing port.	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Project area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	Port of Albany-Rensselaer is not a recreational fishing port.	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Project area does not overlap with recreational ports/harbors. Material impacts to fish stocks not anticipated.
Recreational Resources	There are parks/protected areas, including state park land, nature preserves, state conservation areas, and local parks within 5 miles of the port (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas. Tall cranes would be visible from recreational areas. Increased port traffic could increase traffic congestion at nearby recreational areas.
Tourism	34,643 persons (7.5% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Increased port traffic could increase congestion at nearby recreational areas.
Housing and Lodging	6,036 of the 42,273 vacant housing units in the MSA are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction with relatively little conflict. Influx of up to 4,400 workers during operation may materially impact availability of housing units.
Population	The population is 138,168 within 5 miles of the port and is relatively moderate density. The population within the MSA is 899,262 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The 100 workers during construction would not materially increase MSA population. The creation of 4,400 new jobs during operation could draw workers to the MSA; the effect on a population of 899,262 would be modest.
Labor Force and Employment	The civilian labor force of the MSA is 484,626 and employment is 461,749. The unemployment rate is 4.7% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of 100 workers would not materially increase the labor force or decrease unemployment. Creation of 4,400 jobs in a 484,626-person labor force with 4.7% unemployment would be material.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Income Levels	The per-capita income is \$39,743 within 5 miles of the port and is \$46,752 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of 20–80 workers at prevailing wage levels would not materially alter income levels. Creation of 4,400 jobs in a 484,626-person labor force with 4.7% unemployment could result in a measurable increase in income levels.
Community Cohesion	The four nearest counties have community cohesion index percentiles of 19, 11, 20, and 27, indicating cohesion is below the national median (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2023 total revenue for New York State was \$108.6 billion (New York State Department of Taxation and Finance 2023).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports eight hospitals and 34 schools are within 5 miles of the port. Just over 26% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small, as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- [APDC] Albany Port District Commission. 2019a. *2018 Annual Report*. [accessed May 2024]. https://www.portofalbany.us/wp-content/uploads/2019/06/POA_2018_Annual_Report.pdf.
- [APDC] Albany Port District Commission. 2019b. *Management's Discussion and Analysis*. [accessed 21 November 2024]. <https://www.portofalbany.us/wp-content/uploads/2019/06/2018-annual-report-on-operations.pdf>.
- [APDC] Albany Port District Commission. 2023. *2022 Financial Statement*. [accessed May 2024]. <https://www.portofalbany.us/wp-content/uploads/2023/04/2022-Audited-Financial-Statements.pdf>.
- [APDC] Albany Port District Commission. 2024a. *History of Port Albany*. [accessed 17 May 2024]. <https://www.portofalbany.us/about/port-history/>.
- [APDC] Albany Port District Commission. 2024b. *Offshore Wind Albany*. [accessed 17 May 2024]. <https://www.portofalbany.us/offshore-wind-albany/>.
- ArcGIS Online. 2020. *Military Installations, Ranges, and Training Areas [MIRTA]* [dataset]. [updated 20 November 2023; accessed 11 April 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 30 April 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Curtin EV. 2003. *Additional Phase 1B Archaeological Survey: The Harbor at Beacon Pointe Proposed Development, Town of Bethlehem, Albany County, New York*. Prepared for O.G. Real Estate Developer, LLC. On file, New York State Office of Parks, Recreation, and Historic Preservation. [accessed 17 May 2024]. <https://cris.parks.ny.gov/>.
- [EPA] U.S. Environmental Protection Agency. 2023. *2020 National Emissions Inventory (NEI) Data*. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. *Green Book – New York Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants*. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ny.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. *AirData Air Quality Monitors* [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. *Sentinel-2 10-Meter Land Use/Land Cover* [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Funk RE. 1966. *An Archaic Framework for the Hudson Valley*. Ph.D. Dissertation, Columbia University. University Microfilms, Ann Arbor.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Funk RE. 1991. Late Pleistocene and Early Holocene Human Adaptations in the Lower Hudson Valley. In *The Archaeology and Ethnohistory of the Lower Hudson Valley and Neighboring Regions: Essays in Honor of Louis A. Brennan*, edited by HC Kraft, pp. 49–67. Occasional Publications in Northeastern Anthropology No. 11. Bethlehem (CT).

Funk RE. 1993. *Archaeological Investigations in the Upper Susquehanna Valley, New York State, Volume 1*. Persimmon Press, Buffalo.

Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 15 May 2024].
<https://www.google.com/earth/about/versions/#earth-pro>.

Google Maps. 2024. 41°36'39.9"N 71°24'25.9"W. Street View. [accessed 29 April 2024].
<https://www.google.com/maps/place/41%C2%B036'39.9%22N+71%C2%B024'25.9%22W/@41.611075,-71.4097693,17z/data=!3m1!4b1!4m4!3m3!8m2!3d41.611075!4d-71.4071944?entry=ttu>.

Karp Strategies. 2023, December. *New York State Capitol Region Economic Development Potential for Offshore Wind Infrastructure*. Prepared for Capital Region NY Partners.

Lavin L, Mozzi ME, Bouchard JW, Hartgen K. 1996. The Goldkrest Site: An Undisturbed, Multi-component Woodland Site in the Heart of Mahikan Territory. In *A Northeastern Millennium: History and Archaeology for Robert E. Funk*, edited by C Lindner and EV Curtin. *Journal of Middle Atlantic Archaeology* 12:113–129.

Logistec Terminals Inc. 2024. Technical Sheet – Albany. [accessed May 2024].
https://www.logistecterminals.com/wp-content/uploads/2024/03/TechSheets-Albany_27avril_March2024.pdf.

McIntyre J. 2021. The wind has to wait for history: Historic trains have to move before wind tower factory in Glenmont can break ground. [accessed 17 May 2024]. <https://spotlightnews.com/towns/bethlehem/2021/12/20/the-wind-has-to-wait-for-history-historic-trains-have-to-move-before-wind-tower-factory-in-glenmont-can-break-ground-video/>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 April 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 April 2024].
<https://www.audubon.org/important-bird-areas>.

New York Department of State. 2023. Hudson River Estuary Sediment Type. [accessed 14 May 2024].
<https://opdgidg.dos.ny.gov/datasets/NYSDOS::hudson-river-estuary-sediment-type/about>.

New York Department of Taxation and Finance. 2023. Fiscal year tax collections 2023. [accessed 16 May 2024].
https://www.tax.ny.gov/research/collections/fy_collections_stat_report/2022-2023-annual-statistical-reports.htm.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024].
<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. NY/NJ Metro Area, Hudson River, and South Long Island 2016 ESI (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 9 August 2022; accessed 14 May 2024]. <https://www.fisheries.noaa.gov/inport/item/50664>.

[NOAA] National Oceanic and Atmospheric Administration. 2023. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024].
<https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 April 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[NYDEC] New York Department of Environmental Conservation. 2019. Hudson Valley Core Forests. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about.

[NYDEC] New York Department of Environmental Conservation. 2021. Significant Coastal Fish & Wildlife Habitats-NY. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/bfd454f77fbc4598bb04adea2563acd9_0/explore.

[NYDEC] New York Department of Environmental Conservation. 2022a. Hudson Valley Forest Condition Index. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about.

[NYDEC] New York Department of Environmental Conservation. 2022b. Hudson Valley Significant Biodiversity Areas. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/96a5d825189842f29033c64584cb9a32_0/explore.

[NYDEC] New York Department of Environmental Conservation. 2023. State Regulated Freshwater Wetlands. [accessed 14 May 2024]. <https://data.gis.ny.gov/maps/a57e144caedb4b1aaf510809013e4ac7/about>.

[NYDEC] New York Department of Environmental Conservation. 2024. Natural Heritage Important Areas NYNHP. [accessed 14 May 2024]. <https://data.gis.ny.gov/maps/f249abf4a57d4fc18bb0af2e868cc589/about>.

[NYSERDA] New York State Energy Research and Development Authority. 2019, January. *2018 Ports Assessment: Port of Albany-Rensselaer - Pre-front End Engineering Design Report*. Final Report.

[OPRHP] New York State Office of Parks, Recreation, and Historic Preservation. 2009. Determination of Eligibility: Papscaene Island Historic and Archaeological District. On file, New York State Office of Parks, Recreation, and Historic Preservation. [accessed 15 May 2024]. <https://cris.parks.ny.gov/>.

[OPRHP] New York State Office of Parks, Recreation, and Historic Preservation. 2024. New York State Cultural Resources Information System (CRIS) [database]. [accessed 15 May 2024]. <https://cris.parks.ny.gov/Login.aspx?ReturnUrl=%2f..>

Port of Albany. 2024a. Facilities. [accessed 16 May 2024]. <https://www.portofalbany.us/what-we-do/facilities/#terminal>.

Port of Albany. 2024b. Our Impact - Economic. [accessed 16 May 2024]. <https://www.portofalbany.us/our-impact/economic/>.

[RCRCC] Rensselaer County Regional Chamber of Commerce. 2024. Port of Albany. [accessed 16 May 2024]. <https://www.renscochamber.com/members/port-albany>.

Rulison L. 2022, 28 Sep. Port of Albany walks away from \$29.5 million for wind turbine project. [accessed 15 May 2024]. <https://www.timesunion.com/business/article/Port-of-Albany-walks-away-from-25-million-for-17472551.php>.

Salwen B. 1978. Indians of Southern New England and Long Island: Early Period. In *Northeast*, edited by Bruce G. Trigger, pp. 160-176. *Handbook of North American Indians*, Vol. 15. Smithsonian Institution, Washington, D.C.

ALBANY

Port of Albany–Rensselaer in Albany, New York – 42°36'18.81"N, 73°45'47.97"W

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

Times Union. 2024, 1 March. Offshore wind bids bypass Port of Albany, officials vow to fight on. [accessed 15 May 2024]. <https://www.timesunion.com/business/article/offshore-wind-bids-bypass-port-albany-officials-18697910.php>.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2024. National Transportation Noise Map. [accessed May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 25 April 2024]. <https://doi.org/10.5066/P96WBCHS>.

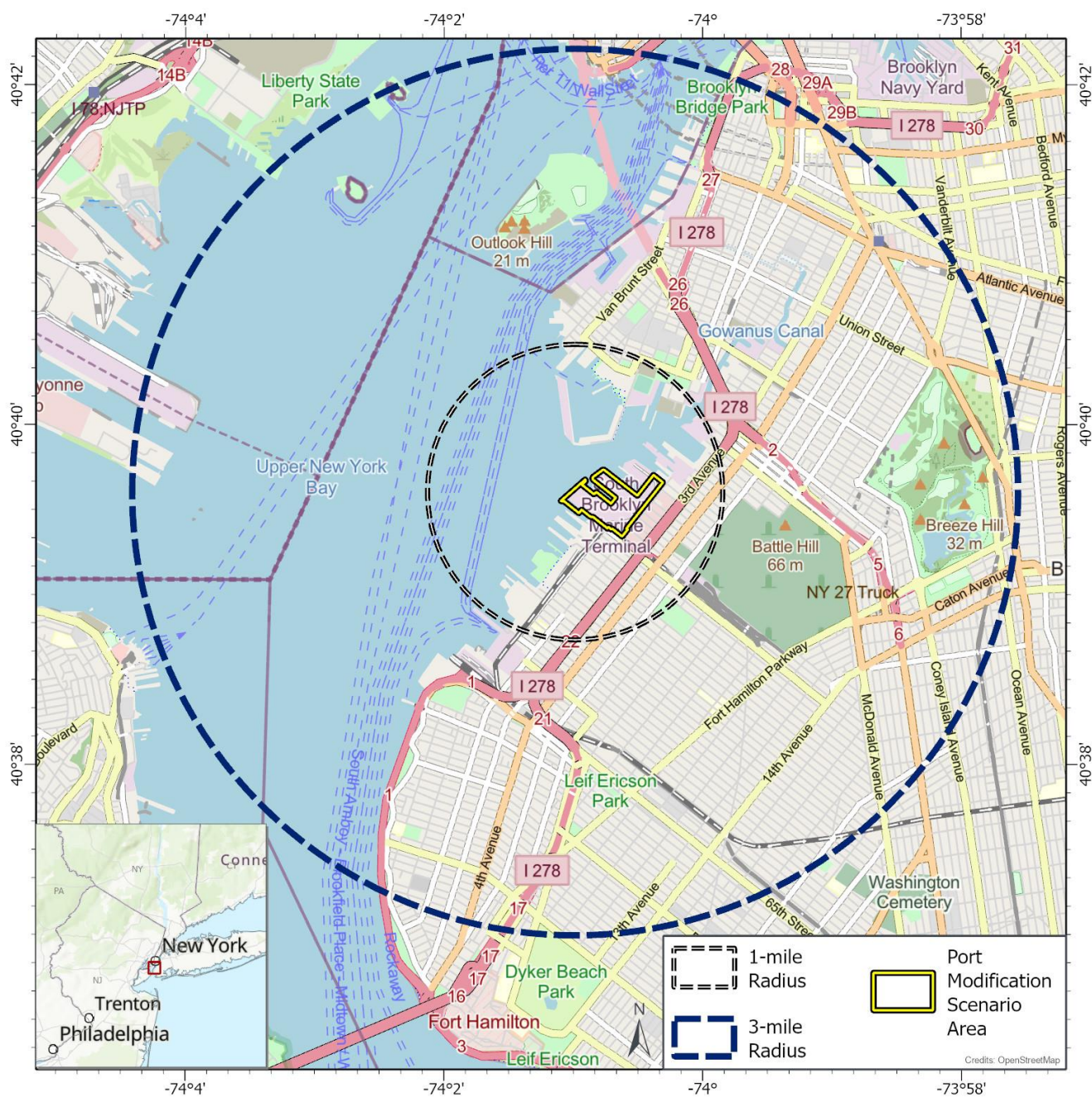
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

BROOKLYN PORT PROFILE

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N,
74°0'59.18"W

Bureau of Ocean Energy Management

December 18, 2024



BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

1 Port Overview

Owner:	City of New York (New York State Energy Research and Development Authority [NYSERDA] 2019)
Operator:	New York City Economic Development Corporation (NYCEDC) Sustainable South Brooklyn Marine Terminal (a Red Hook Container Terminals and Industry City Joint Venture) (NYSERDA 2019) Sims Municipal Recycling (Sims Municipal Recycling 2024)
Primary Existing Uses:	Break-bulk & container (former use) (Red Hook Terminals 2024) Sunset Park Materials Recovery Facility (Sims Municipal Recycling 2024)
Primary Existing Cargo:	None (Red Hook Terminals 2024)
Existing Port Employment:	85 (Sunset Park Materials Recovery Facility) (Sims Municipal Recycling 2024)
Typical Operating Hours:	24/7 (Sunset Park Materials Recovery Facility) (Sims Municipal Recycling 2024)
Terminal Land Area:	88 acres (NYSERDA 2019)
Closest Wind Energy Lease Area:	Equinor Empire Wind (OCS-A 0512)
Distance to Closest Lease Area:	Approximately 51 nautical miles
Potential Offshore Wind Port Uses:	Staging, Assembly, Fabrication, and Operations and Maintenance (O&M)

The South Brooklyn Marine Terminal (SBMT) is located on the eastern shoreline of New York Harbor between 29th and 39th Streets in Brooklyn, New York (NYSERDA 2019). The terminal site occupies 88 acres, with 73 acres targeted for redevelopment to support offshore wind (modification scenario area) (Equinor 2024). The SBMT is owned by the City of New York and is leased to the NYCEDC. The SBMT previously managed break bulk and project cargo and, prior to the 1980s, it was used as a container terminal (Jay Cashman, Inc. 2024).

The existing site includes several structures, an operational rail line, and two bulkheaded piers that have an existing ground bearing capacity of 6,000 pounds per square foot (psf) that are protected by stone revetments. An operational recycling facility (Sunset Park Materials Recovery Facility) is located on the 29th Street pier, adjacent to the portion of the site proposed for redevelopment. The majority of the existing site is paved. The two existing berths are adjacent to a 1,200-foot-wide, federally maintained channel which has an authorized project depth of 40 feet (National Oceanic and Atmospheric Administration [NOAA] 2020a). The SBMT is in close proximity to Brooklyn Queens Expressway/Interstate 278 (I-278) and, as noted, includes on-site rail services.

On March 3, 2022, Equinor Renewables US (Equinor) in partnership with British Petroleum (BP), announced an agreement cosigned by Sustainable South Brooklyn Marine Terminal and NYCEDC to turn the SBMT into a site for O&M and staging for the Empire Wind 1 project (Equinor 2022). In June of 2024, the SBMT redevelopment project broke ground (Equinor 2024). The 73-acre construction project proposes to create a staging and pre-assembly site for the turbine components of Empire Wind 1 and will include an onshore substation (Equinor 2024). Under this agreement, SBMT will become one of the largest dedicated offshore wind ports in the country (Equinor 2022).

The SBMT is air draft limited by the Verrazzano-Narrows Bridge which has an air clearance of 228 feet (NOAA 2020a).

Existing capabilities are summarized in Table 1-1.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	1,200 (NOAA 2020a)
	Port Access Channel Controlling Depth (feet)	40 (NOAA 2020a)
	Overhead / Air Draft Restriction (feet)	228 (Verrazzano-Narrows Bridge)
	Number of Berths	2
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	29.3
	Length (feet)	1,950
	Depth (feet)	36 (Ports of America 2023)
	Suitable for Spud-Jacking (Yes/No)	Yes
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	73 (Equinor 2024)
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Waterfront: 29.8 Storage area: 14.9
	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	9.1
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	No
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (tons)	Up to 3,200 (Vestas 2024)
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	No

Source: NYSERDA (2019), unless otherwise noted.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

As noted by Skanska AB in their April 2024 press release, the proposed redevelopment of the SBMT includes the demolition of existing on-site structures, ground improvements, installation of underground utilities, and upgrades to site lighting, security, and safety systems, and the installation of two new heavy-lift crane pads. The modifications also include waterfront upgrades, including dredging, bulkhead upgrades, and modifications to the existing shoreline revetments. An adjacent administrative area would include 85,000-square-foot building with warehouse, office, and parking to support construction and future operations (Skanska 2024). The conceptual design for these proposed modifications is presented in the 2018 Ports Assessment: South Brooklyn Marine Terminal Pre-Front End Engineering Design Report (NYSERDA 2019).

Modifications required to prepare the upland portion of the site, covering approximately 73 acres, include the demolition of five existing buildings and several minor utility structures, an existing rail spur that extends to the 39th Street pier, and approximately 53 acres of existing asphalt (NYSERDA 2019). Following demolition, the site would be re-graded using site materials to the extent possible. Crushed stone (dense graded aggregate, or DGA) would then be placed and compacted to improve the ground bearing capacity. The upland storage area has been divided into two portions: an 8-acre area near the waterfront that will have an average 4-foot thick layer of DGA placed and compacted for a resulting ground bearing capacity of 6,000 psf, and a 56-acre area that would be used for storage and would have an average 2-foot thick layer of DGA placed and compacted, resulting in a ground-bearing capacity of 3,000 psf (NYSERDA 2019). Upland modifications would also include installation of stormwater management systems, electrical utilities, and security improvements (e.g., fencing and gates).

Modifications required for wharf improvements include the construction of two heavy load wharves including a 6,000-psf relieving platform on the existing 39th Street pier. The 6,000-psf platform would be constructed above and behind a new, anchored sheet pile bulkhead wall and would be steel pipe pile-supported concrete slab with a surface layer of compacted DGA covering approximately 2 acres. The second heavy load wharf would be a 3,000-psf relieving platform constructed on the remaining edge of the 39th Street pier, and at the end of the 35th Street pier,

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

and would cover a combined area of 2.8 acres. The 3,000-psf platforms would be constructed in a similar manner to the 6,000-psf platforms, with less steel pipe pile support and increased pile spacing (NYSERDA 2019).

An additional in-water modification related to the 3,000-psf relieving platforms on the 35th Street pier is the rehabilitation and regrading of existing stone revetments offshore of the wharf face. The conceptual design (NYSERDA 2019) proposes the placement and grading of additional armor stone (assumed to rip-rap in size) to form a “bench” across approximately 5 acres that is intended to provide additional slope stability to the revetment and subsequently additional stability to the wharves.

To provide sufficient access to the wharves, the conceptual design includes dredging of approximately 120,000 cubic yards of sediment between the 39th Street pier and the existing federal navigation channel (approximately 4 acres). Dredging is expected to be performed via mechanical means with upland disposal (NYSERDA 2019) unless the dredged material is deemed to be of sufficient quality to be used on-site for grading and filling activities. Dredging activities would include dredged material dewatering, stabilization, processing and disposal and water treatment in addition to final disposal.

As noted, the port is air-draft restricted by the Verrazzano-Narrows Bridge which has an air clearance of 228 feet, which would limit operations by reducing the available transport height unless some components are transported horizontally.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling, an increase in local terrestrial cargo transportation, and associated worker activities.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Kings County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Brooklyn, New York, includes urban areas with a high population density and a limited industrial presence. Emission sources within the boundaries of Kings County, within the region, and within neighboring metropolitan areas affect the county’s air quality. The Kings County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from fuel combustion (from nonmobile sources), with on-road vehicles being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from on-road vehicles (U.S. Environmental Protection Agency [EPA] 2023a). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Kings County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	12	2	–	–	–
Biogenics*	31	10	–	0	–	253	25	–
Dust	–	–	–	1,607	269	–	–	–
Fires	–	–	–	–	–	–	–	–
Fuel Combustion	2,935	5,552	155	446	389	320	13	–
Industrial Processes§	–	–	–	–	–	61	3	–
Miscellaneous†	1,437	10	1	2,713	2,510	634	152	–
Mobile	48,402	4,934	30	674	286	3,024	902	3,266,075
Point-Sources	373	695	31	49	43	174	24	1,552,981
Total	53,178	11,201	217	5,501	3,499	4,466	1,119	4,819,056

Source: EPA (2023a).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTPy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance (EPA 2023b). Kings County is in nonattainment of the National Ambient Air Quality Standard (NAAQS) for the 2008 and 2015 8-hour ozone. The county is also in maintenance for the 2006 PM_{2.5} standard, and the 1971 CO standards (EPA 2024a). Therefore, the General Conformity Rule is applicable.

Kings County is currently classified as moderate for the 2015 8-hour ozone and Severe 15 for the 2008 8-hour ozone standards; therefore, NO_x will be evaluated as a precursor of O₃. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Kings County reported an O₃ design value of 71.0 parts per billion (ppb) on average for the 2019 to 2021 period, 70.7 ppb on average for the 2020 to 2022 period, and 72.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 2 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	9.17	17.56	0.04	0.71	0.45	0.44	–	3,647.56
Nonroad Emissions	4.00	6.71	0.02	0.72	0.65	0.63	0.35	5,866.46
On-Road Emissions	5.98	0.44	<0.01	0.08	2.85	0.41	0.02	615.44
Fugitive Dust	–	–	–	–	3.13	0.31	–	–
Total	19.39	24.71	0.06	1.51	7.08	1.79	0.37	10,129.46
Conformity De Minimis levels*	100	25	–	25	–	100	–	–

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

* De Minimis levels for Severe 15 nonattainment for the 2008 8-hour ozone standard, and maintenance for the 2006 PM_{2.5} and for CO.

Air emissions from dredging expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.21	0.02	<0.01	<0.01	0.03	0.01	<0.01	21.96
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.20
Total	0.81	0.64	<0.01	0.02	0.04	0.02	<0.01	266.55

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 46.80 kilometers. While the airshed is currently in nonattainment for the 2008 and 2015 8-hour ozone, and in maintenance for the 2006 PM_{2.5} and the 1971 CO standards, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from dredging during construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or O&M. These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The SBMT modification scenario area falls within the borough of Brooklyn in New York City, New York, within the Upper New York Bay, and is surrounded by myriad historic resources (National Park Service [NPS] 2024; New York State Office of Parks, Recreation, and Historic Preservation [OPRHP] 2024). Review of the confidential OPRHP Cultural Resource Information System (NYSCRIS) database and publicly available reference sources identified more than 5,000 previously documented cultural resource inventory points consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects within a 3-mile radius surrounding the modification scenario area (NPS 2024; OPRHP 2024). These inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal levels (NPS 2024; OPRHP 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area in Brooklyn is a 73-acre portion of the 88-acre SBMT site on the waterfront in the Sunset Park and Greenwood Heights neighborhoods that was previously occupied by a cargo handling, manufacturing, and warehousing facility. The modification scenario area was originally a terminus for the New York to South Brooklyn Ferry service until 1935 and was the site of a Staten Island Ferry route until 1946. It was also a rail service hub and is currently adjacent to the site of a waste and recycling center (Google Earth 2024; Red Hook Terminals 2024). Based on recent aerial photographs, the area containing Sims Municipal Recycling facility was redeveloped or constructed beginning in 2011. Based on recent aerial imagery, the modification scenario area encompasses several industrial buildings and warehouses within an extensive paved area and has not been actively used since before the mid-1980s (Google Earth 2024; Red Hook Terminals 2024). These buildings have changed configurations between their definite appearance on aerial imagery in 1994 and the present day, with major removal of structural elements occurring about 2002 and in 2009 to 2010. The remaining structures and ancillary buildings on site are already proposed for removal by the SBMT redevelopment project that broke ground in 2024 (Equinor 2024). The modification scenario area is situated next to a residential and commercial neighborhood, with no visual screening offered by other structures, fence lines, or vegetation along Second Avenue on the southeast side of the modification scenario area (Google Earth 2024). However, large multi-story buildings (generally six to eight stories) along Second Avenue and adjacent areas screen views of properties further inland and across I-278 (to the east-southeast). Shoreline industrial sites similar to those at SBMT are across Gowanus Bay to the northwest, at Red Hook.

Terrestrial Archaeological Resources: Terrestrial archeological sites including Native American Pre-Contact, Contact, and Post-Contact period and Historic period archaeological sites are known to occur within a 3-mile radius, with 86 sites identified in the confidential NYSCRIS database. These archaeological resources include Pre-Contact villages, camp sites, burials, and lithic scatters, and Post-Contact house foundations, trash dumps, cemeteries, and privies (NPS 2024; OPRHP 2024). There is also one NRHP Archaeology District, which encompasses 36 archaeological sites on Governor's Island in Upper New York Bay (Google Earth 2024; NPS 2024; OPRHP 2024). This quantity of archaeological site data indicates an area of moderate to high frequency for archaeological resources.

Within a 1-mile radius, there are three archaeological sites, all of which are historic cemeteries (NPS 2024; OPRHP 2024). Older soils, retaining archaeological potential, may persist undisturbed by previous railway or building construction and existing harbor developments.

Marine Archaeological Resources: Within a 3-mile radius of the SBMT, there are 52 shipwrecks or submerged obstructions (NOAA 2024a). There are two submerged obstructions of unknown age and one historic shipwreck of undetermined NRHP eligibility within 1 mile (NOAA 2024a).

Aboveground Historic Resources: There are more than 5,000 aboveground inventory points listed in the publicly available NYSCRIS database within a 3-mile radius (NPS 2024; OPRHP 2024). These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, foundries), and municipal facilities. Of these resources, 4,971 are eligible for or listed on the NRHP

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

(NPS 2024; OPRHP 2024). There are 35 National Register districts within 3 miles and one National Monument, the Governors Island National Monument, which is also designated as the Governors Island National Historic Landmark District and contains more than 60 contributing structures and buildings (NPS 2024; OPRHP 2024).

There are 1,025 previously documented cultural resource inventory points located within a 1-mile radius, as identified in the publicly available NYSCRIS database (OPRHP 2024). These resources consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists (NPS 2024; OPRHP 2024). Of these, 931 are considered eligible for the NRHP and 94 are either ineligible or of undetermined status (NPS 2024; OPRHP 2024). Five National Register Historic Districts are located within 1 mile (NPS 2024; OPRHP 2024). The historic property data indicates a relatively high frequency of aboveground historic resources.

The buildings and structures in the SBMT are not among the previously documented historic buildings and structures. The five main remaining buildings are known to be pre-1994 based on available aerial imagery (Google Earth 2024). Distinguishable exteriors in aerial imagery indicate that the three buildings on the pier at west are large warehouse spaces with office attached, all appearing to be rectangular and relatively flat-roofed to low-gabled with windows and bay openings consistent with post-1950 (through recent) construction and lacking any architectural flourish. The two-story building facing 2nd Avenue is of consistent construction and time period, with a covered area extending from its southwest side, rather than enclosed warehouse space, and a smallish office tower built into and extending an additional two stories (four stories total) above the northwest corner of the main building. The fifth structure, at the southern corner of the SBMT and near 2nd Avenue, is a single-story sheet metal utility building with two roll-up bay doors visible and no windows.

Cultural Resources Potential: Aerial imagery and historic topographic map review of the 1-mile radius surrounding the SBMT indicates the presence of multiple cultural resources and historic structures (Google Earth 2024; OPRHP 2024). Many of these historic areas, buildings, and structures relate to the emergence of Brooklyn as an historic center for shipping, transportation, and industry during the eighteenth and nineteenth centuries (NPS 2024; OPRHP 2024).

Unknown terrestrial archaeological sites are of low to moderate potential in the proposed modification scenario area or surrounding areas and could also occur adjacent in more deeply buried terrestrial and shoreline deposits or in undisturbed natural areas (intact shoreline sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Port modifications could affect terrestrial soils as well as additional shoreline or riverbed sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in shoreline sediments that are undisturbed by previous dredging, excavation, or erosion. Port modifications could affect bulkhead or “benching” areas along the shore as well as sediment during dredging for port development. Disturbed shoreline and channel sediments could be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the SBMT. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,13,14,19,21}	- The modification scenario area is located within a developed high-density land use area (industrialized) surrounded by high density urban areas within 3 miles. - Isolated ponds, lakes and artificial drainage courses occur within 3 miles.
Shoreline Habitats ⁵	- Within the modification scenario area, and other waterfront industrial areas within 3 miles, the shoreline is primarily characterized as man-made and armored. - There is an isolated area of vegetated low banks adjunct to the modification scenario area to the south, associated with vacant manmade pier infrastructure. Imagery shows it has been fortified with rocks and rubble.
Submerged Marine Habitats ^{16,17}	Benthic substrate within the harbor is primarily sand with pockets of mud/silt and gravel.
Designated Habitats / Places ^{2,3,6,7,8,18,22}	- Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies; and Consolidated Highly Migratory Species. - Habitat Area of Particular Concern: Summer Flounder Submerged Aquatic Vegetation. - Critical Habitat for Atlantic Sturgeon within 3 miles at the mouth of the Hudson River. - Important Bird Area associated with Prospect Park is located 2 miles east of the port. - No Coastal Barrier Resource Area, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{4,20}	- Piping plover, roseate tern, and rufa red knot flyover and forage habitat within 1 mile; tricolored bat habitat and flyways within 3 miles. - Shortnose and Atlantic sturgeon may occur within 1 mile. - Green, Kemp's ridley, leatherback and loggerhead sea turtles may occur within 1 mile.
Migratory Birds and Eagles ^{15,18}	Bald eagles, golden eagles, along with 42 species of migratory birds (some with state protections) have suitable habitat within 1 mile.
Marine Mammals ^{7,8}	Harbor porpoises and Atlantic bottlenose dolphins likely present near modification scenario area.
State Specific Resources ^{9,10,11,12,15}	- City level recreational areas and easements between 1 mile of the modification scenario area. - Hudson Valley Significant Biodiversity Areas: Lower Hudson River and Significant Coastal Fish and Wildlife Habitats located within 3 miles. - Natural Heritage areas occur within 1 mile (Terrestrial 1, centered around Prospect Park), and within 3 miles (Aquatics 82, Hudson River and Diadromous Fishes, East River).

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021, ²National Audubon Society 2024, ³NOAA 2021, ⁴NOAA 2022a, ⁵NOAA 2022b, ⁶NOAA 2023a, ⁷NOAA 2023b, ⁸NOAA 2023c, ⁹New York Department of Environmental Conservation (NYDEC) 2019, ¹⁰NYDEC 2021, ¹¹NYDEC 2022a, ¹²NYDEC 2022b, ¹³NYDEC 2023a, ¹⁴NYDEC 2023b, ¹⁵NYDEC 2024, ¹⁶New York Department of State 2023, ¹⁷The Nature Conservancy 2010, ¹⁸U.S. Fish and Wildlife Service (USFWS) 2023a, ¹⁹USFWS 2023b, ²⁰USFWS 2024, ²¹U.S. Geological Survey (USGS) 2022, ²²USGS 2024.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

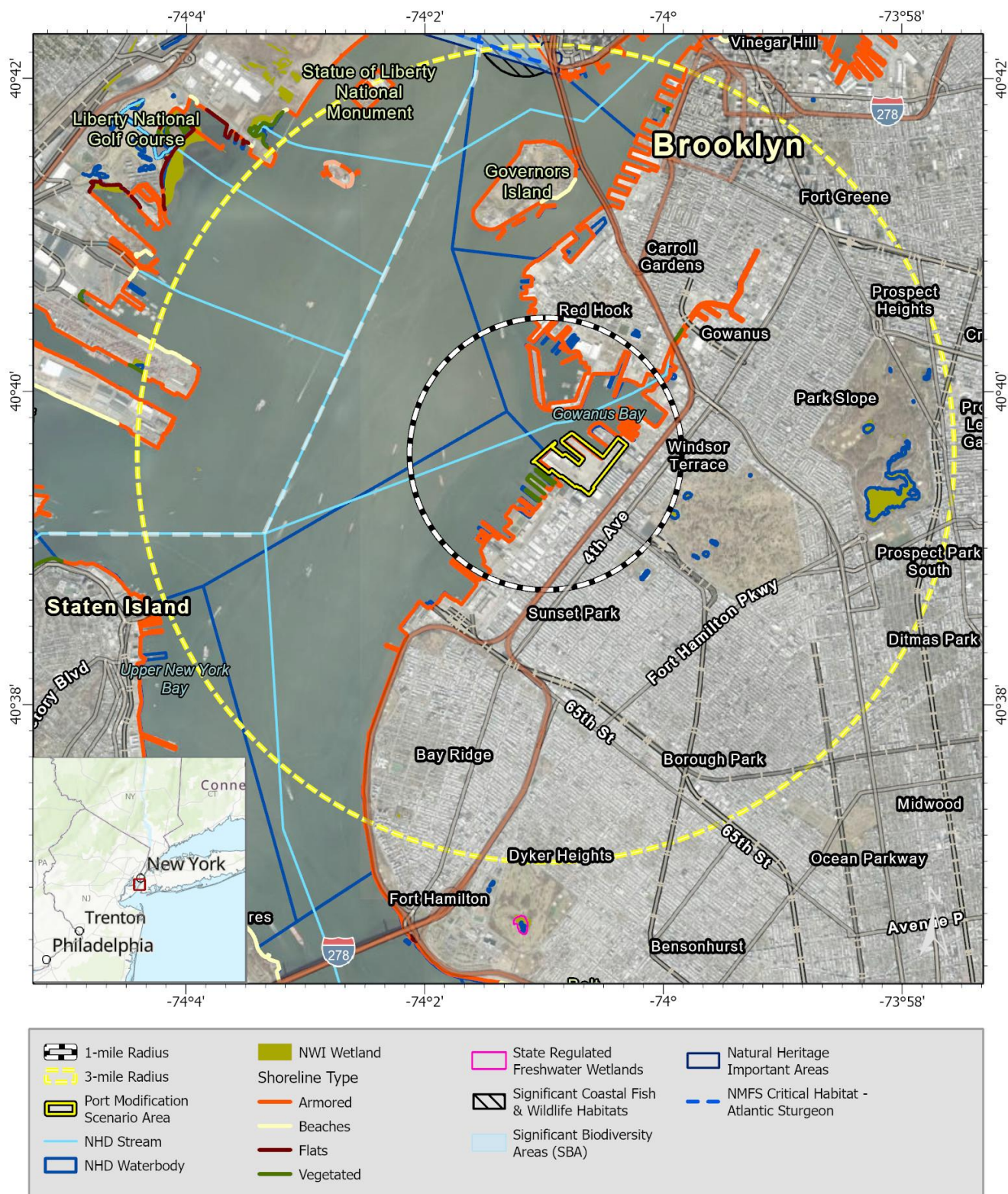


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2023b, 2024b; NYDEC 2021, 2022b, 2023b, 2024; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Sediment disturbance and temporary increase in turbidity due to 4 acres of dredging near existing wharves.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	No terrestrial habitat within the existing port terminal.
Onshore Aquatic Habitats	None	No significant impacts to onshore aquatic habitat, modification scenario area is in an existing fully developed port terminal.
Shoreline	Habitat alteration	Permanent loss of approximately 5 acres of subtidal habitat due to addition of riprap armoring stone.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	Temporary loss of approximately 4 acres of benthic habitat and resources due to dredging near existing wharves.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interaction.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. ESA-listed species, along with bald eagles and some migratory birds with state protections, may utilize habitat and flyways within 1 mile and are at risk from temporary acoustic disturbances. However, acoustic impacts during operations would be consistent with existing land use.
Other Terrestrial Biota	None	Impacts to other terrestrial biota are not expected due to surrounding high density urban areas.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the port is dense urban commercial, residential, and park spaces, with industrial uses immediately adjacent to the port (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	Newark International Airport, JFK Airport, and LaGuardia Airports are 7, 10, and 11 miles from the modification scenario area, respectively. I-278 is the nearest interstate and is less than 1 mile from the modification scenario area. Large highways within 5 miles of the port include I-478, I-78, NY-9A, NY-27, NJ-185, NJ-440, and the Belt Parkway. There is an operational rail line on site (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	One military use area is located within 5 miles of the port: Fort Hamilton (ArcGIS Online 2020).	Cranes interfering with airspace; increased maritime and terrestrial traffic congestion.	The addition of cranes at the port could potentially interfere with airspace for helicopters coming in and out of Fort Hamilton, requiring coordination with the Federal Aviation Administration. Increased terrestrial and marine traffic could interfere with Fort Hamilton ground and maritime activities.
Visual	The existing terminal property and equipment are visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes 200–250 feet tall during construction and operation; lights and vessel activity during operation.	Tall cranes and operational lighting may be visible during construction and operation.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise would reach the adjacent residential, commercial, and recreational areas.
Air Quality	The EPA reports 5 of 6 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Particulate Matter, Ozone, Diesel Particulate Matter, Air Toxics Cancer Risk, and Air Toxics Respiratory Hazard Index are in the 59th, 67th, 98th, 52nd, and 70th percentile nationally, respectively. Asthma risk is in the 52nd percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 94th percentile nationally.	Project-related congestion.	The addition of up to 170 personal vehicles per day during construction and up to 82 vehicles per day during operation is considered immaterial. This increase is minor given the area's robust road infrastructure and the already high levels of existing traffic. Additionally, the availability of public transportation and other alternative modes of transport in the area is likely to mitigate the impact of these additional vehicles.
Maritime Navigation	The nearest marine highways include the East River/ Buttermilk Channel, Hudson River, Upper Bay, The Narrows, Lower Bay and Ambrose Channel routes (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment and dredging. The impact during operation would be contingent upon the number of projects that utilize the port.
Commercial Shipping	The port focuses on waste management and auto assembly, though is currently largely unused (USDOT 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	New York Harbor is not a top U.S. commercial fishing port (NOAA 2022c). Engagement score: medium (NOAA 2020b). Reliance score: low (NOAA 2020b).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. While there is commercial fishing activity in adjacent ports within the New York Harbor area and the increase in maritime traffic associated with the project operation could occasionally affect these activities, significant disruptions are not anticipated. Material impacts to commercially fished stocks are not anticipated.
Recreational Fishing	There are several recreational deep-sea fishing charters in and out of New York Harbor. There are numerous onshore recreational fishing locations within a mile of the port and high recreational fishing activity in the area. Engagement score: high (NOAA 2020b). Reliance score: low (NOAA 2020b).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with regions of popular recreational fishing use, and there are plentiful options for recreational fishing nearby. Although the project is close to popular areas, the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	There are parks/protected areas, including municipal park land, state park land, national recreation areas, national monuments, and federal marine protected areas, within 5 miles of the port (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters during construction and operation. Tall cranes would be visible from recreational areas.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Tourism	784,558 persons (8.0% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services”. In 2023, the New York City area received 62.2 million visitors (U.S. Census Bureau [USCB] 2023a; New York City Tourism and Conventions 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	The addition of up to 170 workers during construction and up to 82 during operation will not materially impact tourism in an area that receives over 60 million visitors annually.
Housing and Lodging	116,891 of the 595,432 vacant housing units in the MSA are available for rent. Numerous hotels/motels are also available (USCB 2023b).	In-migration of project workers.	The addition of up to 170 workers during construction and up to 82 during operation will not materially impact housing and lodging availability.
Population	The population is 2,207,648 within 5 miles of the port and is relatively high density. The population within the MSA is 19.9 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The addition of 170 workers during construction and up to 82 workers during operation would be immaterial to a 19.9-million-person population.
Labor Force and Employment	The civilian labor force of the MSA is 10,467,525 and employment is 9,782,344. The unemployment rate is 6.5% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 170 workers during construction and 82 workers during operation would not materially increase the labor force of almost 10.5 million or impact the unemployment rate of 6.5%.
Income Levels	The per-capita income is \$48,282 within 5 miles of the port and is \$52,011 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of up to 170 workers during construction and 82 during operation at prevailing wage levels would not materially alter income levels.
Community Cohesion	The county containing the modification scenario area (Kings County) ranks in the 1st percentile on the national Community Cohesion Index, the lowest in the country, as reported by Chetty et al. (2022). The three adjacent counties also show below-median cohesion, with Community Cohesion Index percentiles of 1, 2, and 3, respectively.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The total New York State tax revenue for the Fiscal Year 2022-2023 was \$108.6 billion (New York State Department of Taxation and Finance 2023).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports 55 hospitals and 449 schools are within 5 miles of the port. Nearly 27% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- [EPA] U.S. Environmental Protection Agency. 2023a. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 July 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2023b. General Conformity – De Minimis Tables. [updated 29 June 2023; accessed July 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – New York Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ny.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 July 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Equinor. 2024 Jun 10. *Groundbreaking at South Brooklyn Marine Terminal to transform port into NYC offshore wind hub*. [accessed July 2024]. <https://www.equinor.com/news/us/groundbreaking-at-south-brooklyn-marine-terminal-to-transform-port-into-nyc-offshore-wind-hub>.
- Equinor. 2022 Mar 3. Equinor and bp sign agreement to transform South Brooklyn Marine Terminal into central hub for offshore wind industry. [accessed July 2024]. <https://www.equinor.com/news/archive/202202-agreement-south-brooklyn-marine-terminal-offshore-wind-hub>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed July 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed July 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 40°39'36.24"N, 74°0'59.18"W. Street View. [accessed July 2024].
- Jay Cashman, Inc. 2024. South Brooklyn Marine Terminal Dredging / 39th Street Pier. [accessed July 2024]. <https://www.jaycashman.com/uploads/2018/07/39THStreet.pdf>.
- Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.
- National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

New York City Tourism and Conventions. 2024. *Annual Report 2023*. [accessed July 2024]. <https://corporate.nyctourism.com/annual-report/2024>.

New York Department of State. 2023. Hudson River Estuary Sediment Type. [accessed 14 May 2024]. <https://opdgig.dos.ny.gov/datasets/NYSDOS::hudson-river-estuary-sediment-type/about>.

New York State Department of Taxation and Finance. 2023. Annual statistical report of New York State tax collections statistical summaries and historical tables Fiscal Year 2022-2023. [accessed July 2024]. https://www.tax.ny.gov/research/collections/fy_collections_stat_report/2022-2023-annual-statistical-reports.htm.

[NOAA] National Oceanic and Atmospheric Administration. 2020a. Chart No. 12334. 74th ed. Last corrected 31 July 2023.

[NOAA] National Oceanic and Atmospheric Administration. 2020b. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. NY/NJ Metro Area, Hudson River, and South Long Island 2016 ESI (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 9 August 2022; accessed 14 May 2024]. <https://www.fisheries.noaa.gov/inport/item/50664>.

[NOAA] National Oceanic and Atmospheric Administration. 2022c. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. [https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344](https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344;);

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

[NYDEC] New York Department of Environmental Conservation. 2019. Hudson Valley Core Forests. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about..

[NYDEC] New York Department of Environmental Conservation. 2021. Significant Coastal Fish & Wildlife Habitats-NY. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/bfd454f77fbe4598bb04adea2563acd9_0/explore..

[NYDEC] New York Department of Environmental Conservation. 2022a. Hudson Valley Forest Condition Index. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about..

[NYDEC] New York Department of Environmental Conservation. 2022b. Hudson Valley Significant Biodiversity Areas. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/96a5d825189842f29033c64584cb9a32_0/explore..

[NYDEC] New York Department of Environmental Conservation. 2023a. Regulatory Tidal Wetlands. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/661acb5eaffb4be39b0d6d2203e636c3_1/explore..

[NYDEC] New York Department of Environmental Conservation. 2023b. State Regulated Freshwater Wetlands. [accessed 14 May 2024]. <https://data.gis.ny.gov/maps/a57e144caedb4b1aaf510809013e4ac7/about..>

[NYDEC] New York Department of Environmental Conservation. 2024. Natural Heritage Important Areas NYNHP. [accessed 14 May 2024]. <https://data.gis.ny.gov/maps/f249abf4a57d4fc18bb0af2e868cc589/about..>

[NYSERDA] New York State Energy Research and Development Authority. 2019. *2018 Ports Assessment: South Brooklyn Marine Terminal*. Prepared by COWI North America, Inc. January. <https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Offshore-Wind/Resource-Library/Port-South-Brooklyn-Marine-Study.pdf>

[OPRHP] New York State Office of Parks, Recreation, and Historic Preservation. 2024. Cultural Resource Information System (NYSCRIS) Database. [accessed 15 May 2024]. <https://cris.parks.ny.gov/>

Ports of America. 2023. Brooklyn, NY – Brooklyn Cruise Terminal. [accessed 5 Dec 2023]. <https://www.portsofamerica.com/locations/portofbrooklyn-new-york..>

Red Hook Terminals. 2024. South Brooklyn Marine Terminal Off-Shore Wind Port. [accessed June 2024]. <https://www.redhookterminals.com/south-brooklyn-marine-terminal..>

Sims Municipal Recycling. 2024. Sunset Park Materials Recovery Facility – Brooklyn, New York. [accessed June 2024]. <https://smrecycles.com/locations/sunset-park-mrf/>

Skanska. 2024 Apr 26. Skanska awarded contract to develop offshore wind port at South Brooklyn Marine Terminal. [accessed July 2024]. <https://www.usa.skanska.com/who-we-are/media/press-releases/280517/Skanska-awarded-contract-to-develop-offshore-wind-port-at-South-Brooklyn-Marine-Terminal..>

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf..

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf..

[TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston: Eastern Resource Office of The Nature Conservancy. [accessed 6 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html..

BROOKLYN

South Brooklyn Marine Terminal in Brooklyn, New York – 40°39'36.24"N, 74°0'59.18"W

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024].

<https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USDOT] U.S. Department of Transportation. 2024. Port Profiles 2024. Bureau of Transportation Statistics. [accessed 11 May 2024]. <https://explore.dot.gov/views/PortProfiles2024/HomeDashboard?%3Aembed=y>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

Vestas. 2024 Mar 5. Vestas is readying New York for offshore wind and moves forward conditional agreement for the Empire Wind 1 project. [accessed July 2024]. <https://www.vestas.com/en/media/company-news/2024/vestas-is-readying-new-york-for-offshore-wind-and-moves-c3941164>.

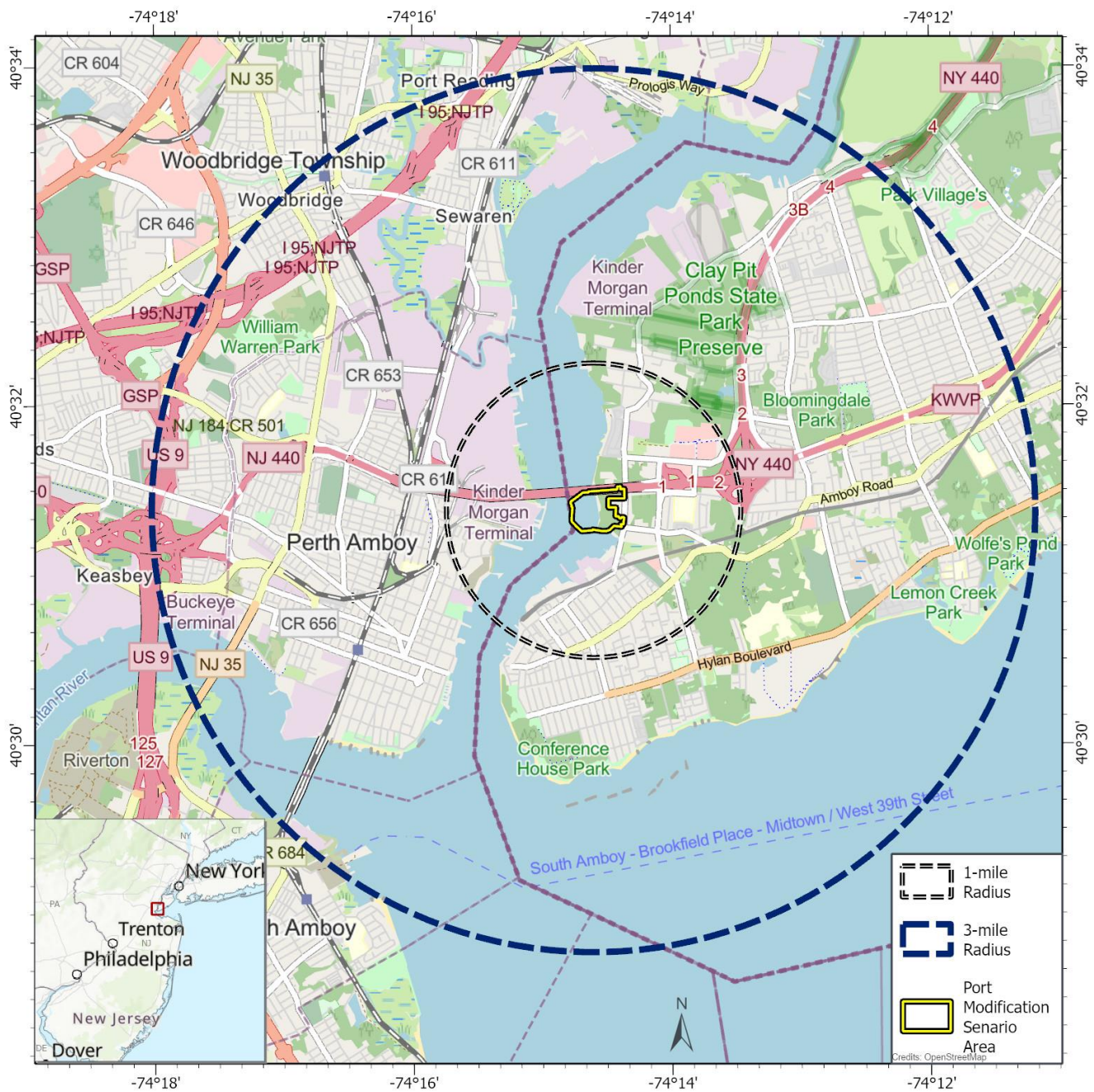
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

ARTHUR KILL PORT PROFILE

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Bureau of Ocean Energy Management

December 18, 2024



ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

1 Port Overview

Owner:	WF Liberty LLC and New SI Water LLC (Habib and Associates [Habib] 2022)
Operator:	None, site undeveloped
Primary Existing Uses:	Not applicable (n/a)
Primary Existing Cargo:	n/a
Existing Port Employment:	n/a
Typical Operating Hours:	n/a
Terminal Land Area:	32.5 acres (Habib 2022)
Closest Wind Energy Lease Area:	Equinor Empire Wind (OCS-A 0512)
Distance to Closest Lease Area:	Approximately 60 nautical miles
Potential Offshore Wind Port Uses:	Staging and assembly, pre-commissioning (Habib 2022)

The Arthur Kill Terminal (AKT) is a proposed site for an offshore wind staging, assembly and pre-commissioning port located on the eastern shoreline of Arthur Kill, on Staten Island, New York, between the townships of Charleston and Tottenville. The site is immediately downstream of the Outerbridge Crossing bridge (New York State Route 440) which connects Staten Island with New Jersey and is adjacent to a federally maintained navigation channel. The AKT site is currently undeveloped and occupies approximately 32.5 acres, 23.6 acres of which are upland and approximately 9 acres of which are submerged land between the existing shoreline and the New York State bulkhead line (Habib 2022).

The AKT site is bordered on the south by Mill/Nassau Creek and the former Nassau Smelting and Refining Company Superfund Site (U.S. Environmental Protection Agency [EPA] ID NYD086225596), as well as two marinas and a vessel repair shop. An active Kinder Morgan petroleum facility is located to the west of the AKT site, on the western shoreline of Arthur Kill in New Jersey. The federally maintained navigation channel has an authorized depth of 36 feet and connects the AKT site to the Atlantic Ocean. There are no overhead restrictions at the site or between the site and the ocean. The AKT site is also adjacent to light industrial and commercial infrastructure (Habib 2022).

The AKT site is located within the coastal zone boundary and within the current 100-year and 500-year flood zones. It is primarily wooded, with fill, urban debris, and a natural beach, but with no public access to the waterfront. The southern half of the site is relatively flat with gentle slopes (Habib 2022). The AKT site was the site of historic filling, with filling events estimated to have occurred in the 1920s, between 1943 and 1951, between 1962 and 1971, and in 1995. An early-nineteenth-century house, the Captain Abram and Ruth Dissosway Cole House (Dissosway Cole House), is located on the west side of Arthur Kill Road and within the AKT site (Habib 2022).

The AKT is proposed for development by Atlantic Offshore Terminals. In May 2024, a request for proposals was issued for construction (Ostapiuk 2024). The project received \$48 million in federal funding in 2022 (Ostapiuk 2024) and is poised to become operational as early as 2027 (Arthur Kill Terminal 2024).

Existing capabilities are summarized in Table 1-1.

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	600 (NOAA 2014)
	Port Access Channel Controlling Depth (feet)	36 (NOAA 2014)
	Overhead / Air Draft Restriction (feet)	None
	Number of Berths	None

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Capability Area	Criteria (Units)	Value
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	n/a, site undeveloped
	Length (feet)	1,420 linear feet of water frontage
	Depth (feet)	1 to 4 (NOAA 2014)
	Suitable for Spud-Jacking (Yes/No)	Yes
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	32.5
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Low, site filled with previous fill
	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	None on-site
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	n/a, site undeveloped
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (tons)	n/a
	Height Restrictions (Yes/No)	n/a
Transportation	On-Site Rail (Yes/No)	No
	On-Site Highway (Yes/No)	No

Source: Habib (2022), unless otherwise noted.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for the proposed AKT is presented in the *Arthur Kill Terminal Environmental Assessment Statement*, which was prepared in 2022 by Philip Habib and Associates (Habib 2022). The proposed development of the site includes construction of 1,365 linear feet of heavy load quays with a proposed ground-bearing capacity of 5,000 psf, approximately 28.5 acres of upland storage, and assembly and pre-assembly areas; dredging; installing armoring along the dredge footprint sideslopes; construction of jack-up pad within the dredge basin; new access roads; the construction of two buildings for tenant use, including a warehouse and office space; and the redevelopment of the existing Dissosway Cole House, which will be converted to a visitor's center and owner's office space (Habib 2022).

Modifications required to provide sufficient access to the proposed quays include dredging an approximately 18-acre footprint between the New York State bulkhead line and the existing federal navigation channel followed by the installation of armoring along the dredge footprint side slopes. Based on the area (roughly 18 acres), the proposed dredge depth of 36 feet (to match the federal navigation channel), and the existing depths within the dredge footprint (National Oceanic and Atmospheric Administration [NOAA] 2014), it is estimated that nearly 1 million cubic yards of dredging would be required. Dredging is expected to be performed via mechanical means. Following dewatering and dredged material stabilization, the concept documents call for the dredged material to be used on-site for upland grading and filling below the proposed quays (Habib 2022). In addition, as noted, the dredge footprint side slopes would be armored over an approximately 1.15-acre area to prevent scour from vessel propwash.

Within the dredge footprint, a 400 × 100-foot area would be prepared for use as a jack-up vessel pad adjacent to the outbound quay. Modifications required to construct the jack-up pad include over-dredging by 10 additional feet within the approximately 1-acre footprint and backfilling with a layer of riprap-sized armor stone to form a dense stone mat (Habib 2022).

Modifications required to construct the two proposed quays (inbound and outbound), which combined would be 1,365 linear feet (Habib 2022), would include the construction of a sheet pile wall bulkhead to contain fill, including dewatered and stabilized dredged material and aggregate material. The final quay surface would consist of a thick layer of dense graded aggregate (DGA) which would be placed and compacted for a resulting ground-bearing capacity of 5,000 psf. On the quays, the concept documents propose the use of three mobile cranes, two on the inbound quay and one operating on the outbound quay (Habib 2022).

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Modifications required to prepare the upland portion of the site, which will cover approximately 28.5 acres and be used for storage, assembly, and pre-assembly operations, include land clearing and grading using processed dredged material. The concept documents note that approximately 380,000 cubic yards of upland fill would be required to achieve required grades (Habib 2022). Similar to the quays, the final surface would consist of a thick layer of DGA, which would be placed and compacted for a final surface with a ground-bearing capacity of 5,000 psf.

Additional modifications related to upland construction include the construction of a two-story, 22,500-square-foot warehouse and office building and an associated parking lot. The existing Dissoyway Cole House would be redeveloped to act as an owner's office and educational visitors center (Habib 2022). Additional parking would be provided as well as security fencing, gates, lighting, and stormwater collection and management systems.

There are no air draft restrictions associated with the AKT site or between the site and the ocean.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling, an increase in local terrestrial cargo transportation, and associated worker activities; in this case, the proposed AKT site is currently undeveloped, and all new ship calls would represent an increase in emissions from the ships, cargo operations, and on-site worker activity.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Richmond County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Richmond County, New York, includes urban areas with a moderate population density and a moderate industrial base. Emission sources within the boundaries of Richmond County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Richmond County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (EPA 2023a). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Richmond County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	24	5	–	–	–
Biogenics*	70	14	–	–	–	723	57	–
Dust	–	–	–	656	100	–	–	–
Fires	–	–	–	–	–	–	–	–
Fuel Combustion	916	1,010	30	139	128	117	23	–
Industrial Processes§	–	–	–	–	–	93	4	–
Miscellaneous†	280	3	–	415	382	157	29	–
Mobile	15,633	2,537	28	230	115	1,210	345	1,210,505
Point-Sources	427	357	4	43	44	32	7	761,931
Total	17,326	3,921	62	1,507	772	2,332	465	1,972,436

Source: EPA (2023a).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. Richmond County is in nonattainment of the National Ambient Air Quality Standard (NAAQS) for the 2008 and 2015 8-hour

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

ozone. The county is also in maintenance for the 2006 PM_{2.5} standard, and the 1971 CO standards (EPA 2024a). Therefore, the General Conformity Rule is applicable (EPA 2023b).

Richmond County is currently classified as moderate for the 2015 8-hour ozone and Severe 15 for the 2008 8-hour ozone standards; therefore, NO_x will be evaluated as a precursor of O₃. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Kings County reported an O₃ design value of 67.0 parts per billion (ppb) on average for the 2019 to 2021 period, 66.3 ppb on average for the 2020 to 2022 period, and 69.0 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 9 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	13.12	25.13	0.05	1.02	0.64	0.62	–	5,219.44
Nonroad Emissions	1.68	5.26	0.01	0.30	0.27	0.26	0.15	2,490.30
On-Road Emissions	2.34	0.17	<0.01	0.03	0.35	0.09	0.01	240.39
Fugitive Dust	–	–	–	–	2.19	0.22	–	–
Total	17.13	30.56	0.06	1.36	3.45	1.19	0.16	7,950.14
Conformity De Minimis levels¹	100	25	–	25	–	100	–	–

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

¹ De Minimis levels for Severe 15 nonattainment for the 2008 8-hour ozone standard, and maintenance for the 2006 PM_{2.5} and for CO.

Based on preliminary calculations, air emissions from dredging expansion could significantly add to existing emissions, surpassing the NO_x Conformity De Minimis levels as shown in Table 2-2. Port-specific air quality analyses and monitoring, based on final designs and construction plans, would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.11	0.01	<0.01	<0.01	0.02	<0.01	<0.01	11.83
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11
Total	0.71	0.63	<0.01	0.02	0.04	0.02	<0.01	256.33

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the new berth construction phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 59.15 kilometers. While the airshed is currently in nonattainment for the 2008 and 2015 8-hour ozone, and maintenance for the 2006 PM_{2.5} standard, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from dredging during construction. As a potential mitigation strategy, using Tier 3 or Tier 4 engines for mobile and portable sources and evaluating ways to reduce operating hours could be beneficial for the project.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Identified Cultural Resources: The Arthur Kill Terminal modification scenario area falls within the borough of Staten Island in New York City, New York, along the Arthur Kill within Raritan Bay at the southern end of Lower New York Bay and includes myriad historic resources (National Park Service [NPS] 2024; New York State Office of Parks, Recreation, and Historic Preservation [OPRHP] 2024). Review of the confidential OPRHP Cultural Resource Information System (NYSCRIS) database and publicly available reference sources identified more than 700 previously documented cultural resource inventory points consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects across the borough of Staten Island (NPS 2024; OPRHP 2024). These inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal levels (NPS 2024; OPRHP 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area in Staten Island is situated on a 32-acre parcel south of Outerbridge Crossing and located within a mostly wooded property surrounded by the Arthur Kill tidal strait to the west and Arthur Kill Road to the east. Early settlement by Lenape Native American groups was followed by Dutch settlement in the seventeenth century. Early commercial fishing and shell fishing industries were established during the nineteenth and early twentieth centuries, which preceded later ship building, manufacturing, petrochemical processing, and landfill industries (Staten Island History 2024). The northeast corner of the modification scenario area is adjacent to several commercial buildings and paved parking lots, including the former Dissosway Cole House. The southwest portion of the parcel is wooded with unpaved roads (Google Earth 2024). The AKT site is situated next to a primarily commercial neighborhood with visual screening offered by mature trees and commercial warehouse and retail buildings, interspersed with larger multi-story buildings (3–4 stories) along Arthur Kill Road (Google Earth 2024). The AKT faces the Kinder Morgan petroleum facility in New Jersey across the Arthur Kill tidal strait. The Outerbridge Crossing is to the north of the AKT, supporting State Route 440.

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Native American Pre-Contact, Contact, and Post-Contact period and Historic period archaeological sites, are known to occur within 3 miles of the modification scenario area, with 188 sites identified in the confidential NYSCRIS database. These archaeological resources include Pre-Contact villages, camp sites, burials, and lithic scatters, and Post-Contact house foundations, trash dumps, and industrial centers (NPS 2024; OPRHP 2024). There is also one NRHP Archaeology District, which commemorates an early settlement of formerly enslaved Africans (Google Earth 2024; NPS 2024; OPRHP 2024). This quantity of archaeological site data indicates an area of moderate to high frequency for archaeological resources.

Within a 1-mile radius, there are 60 inventory points of Pre-Contact Native American and Historic Euro-American character. Two of these archaeological sites are NRHP-listed, including the abovementioned archaeological district, and there are 10 NRHP-eligible sites (NPS 2024; OPRHP 2024). Older soils may persist undisturbed within isolated or undeveloped portions of this parcel and may preserve archaeological resources.

Marine Archaeological Resources: Within a 3-mile radius, there are 57 known shipwrecks or submerged obstructions, 26 of which are within a 1-mile radius (National Oceanic and Atmospheric Administration [NOAA] 2024a). These include wooden and metal obstructions made up of fragments or whole barges, submerged docks, ships, and boats, as old as the nineteenth century and with undetermined NRHP eligibility (NOAA 2024a; OPRHP 2024). Two named historic wrecks are identified within the 1-mile radius (OPRHP 2024).

Aboveground Historic Resources: Within a 3-mile radius, there are more than 520 aboveground inventory points listed in the publicly available NYSCRIS database (NPS 2024; OPRHP 2024). These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, foundries), and municipal facilities. Of these resources, seven are listed and 67 are eligible for the NRHP, with 280 of undetermined status (NPS 2024; OPRHP 2024). There is one National Register district within the 3-mile radius, which is also a National Historic Archaeological District (NPS 2024; OPRHP 2024).

There are 175 previously documented cultural resource inventory points located within 1 mile (OPRHP 2024). These resources consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists (NPS 2024; OPRHP 2024). Within the 1-mile radius, one of these resources is NRHP-listed, 33 are

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

considered eligible for the NRHP, and 94 are of undetermined status (NPS 2024; OPRHP 2024). There are no National Register Historic Districts located within 1 mile (NPS 2024; OPRHP 2024). The historic property data indicates a relatively high frequency of aboveground historic resources.

At least one of the buildings and structures in the AKT site is among the previously documented historic buildings and structures. Three of the eight buildings adjacent to the parcel are known to be pre-1994 based on available aerial imagery (Google Earth 2024). Distinguishable exteriors in aerial imagery indicate that the three buildings are large warehouses or commercial spaces with office or retail space attached and extensive parking lots. These appear to be rectangular and relatively flat-roofed to low-gabled or gambrel types with windows and bay openings consistent with post-1950 (through recent) construction and lacking significant architectural embellishment. The two-story building at 4927 Arthur Kill Road is formerly an 1840s house (the Dissosway Cole House), which presents multiple additions built on the north side of the original structure and is slated to be a visitor's center for the Atlantic Offshore Terminals wind turbine facility at AKT (OPRHP 2024; Somma-Hammel 2023). Identified in the publicly available NYSCRIS database as the Cole House, the Dissosway Cole House was advocated for New York landmarking in 2008 (Historic Districts Council 2008) but was apparently not landmarked (Prendamano Real Estate 2015). Many of the alterations to the building were from historic times; however, a 1999 fire also substantially altered the building (Historic Districts Council 2008). It was determined to be not eligible for the NRHP in 2016 (OPRHP 2024).

Cultural Resources Potential: Aerial imagery and historic topographic map review of the 1-mile radius surrounding the modification scenario area indicates the presence of multiple cultural resources and historic buildings and structures (Google Earth 2024; OPRHP 2024). Many of these historic areas, buildings, and structures relate to the emergence of Staten Island as an historic center for commercial fishing, shipping, and industry during the eighteenth through twentieth centuries (NPS 2024; OPRHP 2024).

Unknown terrestrial archaeological sites are of moderate potential in the proposed modification scenario area or surrounding areas and could also occur adjacent in more deeply buried terrestrial and shoreline deposits or in undisturbed natural areas (intact shoreline sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Port modifications through clearing, fill, or excavation could affect the terrestrial soils across the AKT parcel as well as additional shoreline or riverbed sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the modification scenario area represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in shoreline sediments that are undisturbed by previous dredging, excavation, or erosion. Port modifications could affect areas for wharf construction, dredging, and placement of rip rap for port development. Disturbed shoreline and channel sediments could be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high-intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,13,14,19,21}	• Situated along the banks of the Arthur Kill, within a medium- to high-density developed area, on an undeveloped parcel which includes deciduous forest and wetland habitats. • Mill Creek and other small streams drain into the modification scenario area. • Isolated intertidal wetlands, woody and emergent wetlands, including state protected wetlands, and artificial drainage courses occur within 1 mile. • Additional intertidal estuarine wetlands and emergent wetlands, primarily to the west and south, occur within 3 miles. • Forested habitats are found to the east and south within 1 mile.
Shoreline Habitats ⁵	• Within the modification scenario area, shoreline is characterized as sand and gravel beach with some saltmarsh areas, associated with the Mill Creek drainage area • Shoreline to the north and south, and on the west bank of the Arthur Kill, are characterized by man-made features such as riprap and heavier armoring.
Submerged Marine Habitats ^{16,17}	• Benthic substrate is primarily gravel with pockets of sand within the maintained channel.
Designated Habitats/Places ^{2,3,6,7,8,18,22}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies. • Habitat Area of Particular Concern: Summer Flounder Submerged Aquatic Vegetation. • Important Bird Areas: Arthur Kill Complex and Tributaries and Clay Pit Ponds State Park Preserve within 1 mile. • No Critical Habitat, Coastal Barrier Resource Area, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{4,20}	• Piping plover habitat within 1 mile; tricolored bat habitat and flyways within 3 miles. • Shortnose and Atlantic sturgeon may occur within 1 mile. • Sea turtles may occur within 3 miles. • North Atlantic right whale and fin whales may occur with 3 miles, in the open waters of Raritan Bay to the south.
Migratory Birds and Eagles ^{15,18}	• Bald eagles, golden eagles, along with 9 species of migratory birds (some with state protections) have suitable habitat within 1 mile.
Marine Mammals ^{7,8}	• Harbor porpoises and Atlantic bottlenose dolphins may be present near modification scenario area.
State Specific Resources ^{9,10,11,12,15}	• County and city level recreational areas and easements within 1 mile. • Significant Biodiversity Area (aquatic habitat) located within 1 mile to the north

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021; ²National Audubon Society 2024; ³NOAA National Oceanic and Atmospheric Administration (NOAA) 2021; ⁴NOAA 2022a; ⁵NOAA 2022b; ⁶NOAA 2023a; ⁷NOAA 2023b; ⁸NOAA 2023c; ⁹New York Department of Environmental Conservation (NYDEC) 2019; ¹⁰NYDEC 2021; ¹¹NYDEC 2022a; ¹²NYDEC 2022b; ¹³NYDEC 2023a; ¹⁴NYDEC 2023b; ¹⁵NYDEC 2024; ¹⁶New York Department of State 2023; ¹⁷The Nature Conservancy 2010; ¹⁸U.S. Fish and Wildlife Service (USFWS) 2023a; ¹⁹USFWS 2023b; ²⁰USFWS 2024; ²¹U.S. Geological Survey (USGS) 2022; ²²USGS 2024.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

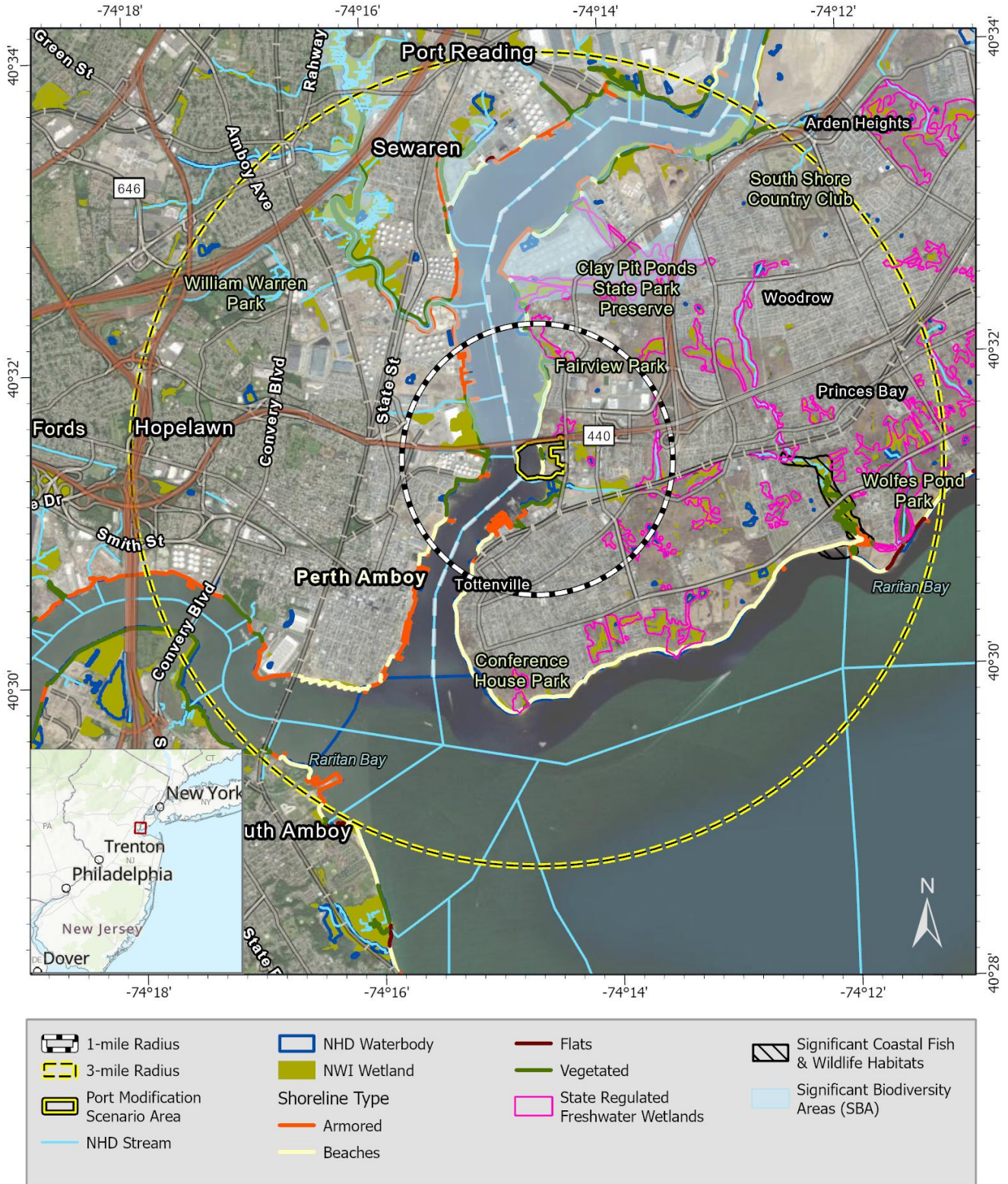


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2024b; NYDEC 2022b, 2023d; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Table 4-2. Ecological Impacts and Mitigating Measures

Affected Resource	Primary Impact-Causing Elements	Impact Description
Water Quality	Sediment suspension and deposition; dewatering	Sediment disturbance and temporary increase in turbidity associated with dredging activities for the new berths.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of ~25 acres due to clearing for infrastructure/storage/laydown areas, administrative areas, and roads.
Onshore Aquatic Habitats	Aquatic habitat alteration	Permanent loss of ~2 acres of wetlands due to clearing for infrastructure/storage/laydown areas, administrative areas, and roads.
Shoreline	Habitat alteration	Conversion of ~4 acres of sand/gravel beach to riprap and stone
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	Permanent loss of ~9 acres of marine habitat and resources due to berth construction and placement of riprap. Temporary disturbance of ~18 acres of benthic habitat due to dredging.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operations leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from sheet pile installation, and construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances. However, acoustic impacts during operations would be similar to the existing land use within 1 mile.
Other Terrestrial Biota	Terrestrial noise	Impacts may occur due to construction and operations noise; however, acoustic impacts during operations would be consistent with surrounding existing land use within 1 mile.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use at the modification scenario area is currently undeveloped, with forest cover and a natural beach. The land use within 5 miles of the modification scenario area is primarily mixed commercial and residential. Across the Arthur Kill Strait from the modification scenario area is an industrial center developed around a petroleum facility (Esri 2023).	Port development.	The port modification area is unused and inaccessible to the public.
Infrastructure	The Linden Municipal Airport is 6 miles northwest of the modification scenario area. I-95 is the nearest interstate and is less than 1 mile from the modification scenario area. Large highways within 5 miles include US-1, US-9, NY-440, NJ-27, NJ-35, and NJ-184, and NJ-440 (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	There are no active military use areas within 5 miles of the modification scenario area (ArcGIS Online 2020).	None.	In the proposed port modification scenario, special use areas would not be affected.
Visual	The existing terminal property is visible from nearby commercial and recreational areas but not generally visible from residential areas due to intervening landscape (Google Maps 2024).	Up to 300-foot barge-mounted cranes during construction and operation; lights and vessel activity during operation.	Tall cranes and operational lighting may be visible from residential, commercial, and recreational areas during construction and operation.
Noise	Noise levels are high within 5 miles of the modification scenario area, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. Operational noise would reach the adjacent residential, commercial, and recreational areas.
Air Quality	The EPA reports 4 of 5 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Ozone, Nitrogen Dioxide, Diesel Particulate Matter, and Toxic Releases to Air are in the 55th, 60th, 86th, and 65th percentile nationally, respectively. Asthma risk is in the 34th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the modification scenario area is in the 74th percentile nationally.	Project-related congestion.	The addition of up to 170 personal vehicles per day during construction and up to 207 vehicles per day during operation is considered minor given the area's robust road infrastructure and the already high levels of existing traffic. Additionally, the availability of public transportation and other alternative modes of transport in the area are likely to mitigate the impact of these additional vehicles.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Maritime Navigation	The nearest marine highways include the Buttermilk Channel, Hudson River, Upper Bay, The Narrows, Lower Bay, and Ambrose Channel routes (USDOT 2018).	Increased maritime traffic.	One additional feeder barge trip a day during construction is unlikely to impact maritime navigation. The impact during operation would be contingent upon the number of projects that use the port.
Commercial Shipping	The proposed terminal site currently has no shipping activity. Across the Arthur Kill Strait is the Kinder Morgan Petroleum facility, shipping biofuels, petroleum products, chemicals, and dry bulk (Kinder Morgan 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	New York Harbor is not a top U.S. commercial fishing port (NOAA 2022c). Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with commercial fishing ports/harbors. While there is commercial fishing activity in adjacent ports within the New York Harbor area and the increase in maritime traffic associated with the project operation could occasionally affect these activities, significant disruptions are not anticipated. Material impacts to commercially fished stocks are not anticipated.
Recreational Fishing	There are several recreational deep-sea fishing charters in and out of New York Harbor. There are numerous onshore recreational fishing locations within a mile of the modification scenario area and high recreational fishing activity in the area. Engagement score: high (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with regions of popular recreational fishing use, and there are plentiful options for recreational fishing nearby. Although the modification scenario area is close to popular areas, the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	There are parks/protected areas, including municipal park land, state park land, national recreation areas, national monuments, and federal marine protected areas, within 5 miles of the modification scenario area (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters during construction and operation. Tall cranes would be visible from recreational areas.
Tourism	784,558 persons (8.0% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services.” In 2023, the New York City area received 62.2 million visitors (New York City Tourism and Conventions 2024; U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	The addition of up to 170 workers during construction and up to 207 during operation will not materially impact tourism in an area that receives over 60 million visitors annually.
Housing and Lodging	116,891 of the 595,432 vacant housing units in the MSA are available for rent. Numerous hotels/motels are also available (USCB 2023b).	In-migration of project workers.	The addition of up to 170 workers during construction and up to 207 during operation will not materially impact housing and lodging availability.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Population	The population is 303,971 within 5 miles of the modification scenario area and is relatively high density. The population within the MSA is 19.9 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The addition of 170 workers during construction and up to 207 workers during operation would be immaterial to a 19.9-million-person population.
Labor Force and Employment	The civilian labor force of the MSA is 10,467,525 and employment is 9,782,344. The unemployment rate is 6.5% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 170 workers during construction and 207 workers during operation would not materially increase the labor force of almost 10.5 million or impact the unemployment rate of 6.5%.
Income Levels	The per-capita income is \$52,011 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of up to 170 workers during construction and 207 during operation at prevailing wage levels would not materially alter income levels.
Community Cohesion	The county containing the modification scenario area (Richmond County) ranks in the 3rd percentile on the national Community Cohesion Index, among the lowest in the country, as reported by Chetty et al. (2022). The four adjacent counties also show below-median cohesion, with Community Cohesion Index percentiles of 1, 3, 9, and 23.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The total New York State tax revenue for the Fiscal Year 2022-2023 was \$108.6 billion (New York State Department of Taxation and Finance 2023).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports four hospitals and 57 schools are within 5 miles of the modification scenario area. Nearly 27% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively minor as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- Arthur Kill Terminal. 2024. The Project – Arthur Kill Terminal. [accessed July 2024]. <https://www.arthurkillterminal.com/the-project.html>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- [EPA] U.S. Environmental Protection Agency. 2023a. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2023b. General Conformity – De Minimis Tables. [updated 29 June 2023; accessed July 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – New York Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 April 2024]. https://www3.epa.gov/airquality/greenbook/anayo_ny.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 40°38'25.23"N, 74°11'23.46"W. Street View. [accessed 9 May 2024].
- [Habib] Habib and Associates. 2022 Nov 14. *Arthur Kill Terminal (AKT) Environmental Assessment Statement*. Prepared for Arthur Kill Terminal LLC.
- Historic Districts Council. 2008. HDC Testifies In Favor of Designating Staten Island's Dissosway Cole House. [accessed 22 July 2024]. <https://hdc.org/hdc-testifies-in-favor-of-designating-staten-islands-dissoway-cole-house/>.
- Kinder Morgan. 2024. Perth Amboy Terminal. [accessed July 2024]. <https://www.kindermorgan.com/WWKMMedia/Terminals/Northeast-Perth-Amboy.pdf>.
- Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024].
<https://www.audubon.org/important-bird-areas>.

New York State Department of Taxation and Finance. 2023. Annual statistical report of New York State tax collections statistical summaries and historical tables Fiscal Year 2022-2023. [accessed July 2024].
https://www.tax.ny.gov/research/collections/fy_collections_stat_report/2022-2023-annual-statistical-reports.htm.

[NOAA] National Oceanic and Atmospheric Administration. 2014. Nautical Chart No. 12331. 33rd ed. Last correction 8 November 2023.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024].
<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 14 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. NY/NJ Metro Area, Hudson River, and South Long Island 2016 ESI (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 9 August 2022; accessed 14 May 2024]. <https://www.fisheries.noaa.gov/inport/item/50664>.

[NOAA] National Oceanic and Atmospheric Administration. 2022c. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed July 2024].
<https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:>

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024].
<https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024].
<https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024].
<https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[NYDEC] New York Department of Environmental Conservation. 2019. Hudson Valley Core Forests. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

- [NYDEC] New York Department of Environmental Conservation. 2021. Significant Coastal Fish & Wildlife Habitats-NY. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/bfd454f77f7be4598bb04adea2563acd9_0/explore.
- [NYDEC] New York Department of Environmental Conservation. 2022a. Hudson Valley Forest Condition Index. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/7cd52eabe28f4c70bf504b22918cd599_0/about.
- [NYDEC] New York Department of Environmental Conservation. 2022b. Hudson Valley Significant Biodiversity Areas. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/96a5d825189842f29033c64584cb9a32_0/explore.
- [NYDEC] New York Department of Environmental Conservation. 2023a. Regulatory Tidal Wetlands. [accessed 14 May 2024]. https://data.gis.ny.gov/datasets/661acb5eaffb4be39b0d6d2203e636c3_1/explore.
- [NYDEC] New York Department of Environmental Conservation. 2023d. State Regulated Freshwater Wetlands. [accessed 14 May 2024]. <https://data.gis.ny.gov/maps/a57e144caedb4b1aaf510809013e4ac7/about>.
- [NYDEC] New York Department of Environmental Conservation. 2024. Natural Heritage Important Areas NYNHP. [accessed 14 May 2024]. <https://data.gis.ny.gov/maps/f249abf4a57d4fc18bb0af2e868cc589/about>.
- [NYDOS] New York Department of State. 2023. Hudson River Estuary Sediment Type. [accessed 14 May 2024]. <https://opdgig.dos.ny.gov/datasets/NYSDOS::hudson-river-estuary-sediment-type/about>.
- [OPRHP] New York State Office of Parks, Recreation, and Historic Preservation Cultural Resource Information System (NYSCRIS) Database. 2009. [accessed 15 May 2024]. <https://cris.parks.ny.gov/>.
- Ostapiuk J. 2024 May 24. Staten Island's Arthur Kill Terminal reaches 'important step' in its path to offshore wind industry. *Staten Island Live*. [accessed July 2024]. <https://www.silive.com/news/2023/05/staten-islands-arthur-kill-terminal-reaches-important-step-in-its-path-to-offshore-wind-industry.html>.
- Prendamano Real Estate. 2015. Riverside Galleria to Open in the Charleston Section of Staten Island. PreReal [website]. [accessed 22 July 2024]. <https://www.prereal.com/blog/new-retail-complex-with-movie-theater-coming-to-charleston-waterfront.html>.
- Somma-Hammel J. 2023. Cool Spaces: The 1840s Cole House to become a visitors center. *Staten Island Live*. [accessed 14 July 2024]. <https://www.silive.com/galleries/7QQ6ET7XV5EEFLEPO3HFZIIGMY/>.
- Staten Island History. 2024. Staten Island History. [accessed 14 July 2024]. <https://www.statenislandhistorian.com/history.html>.
- Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.
- Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.
- [TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston, Massachusetts: Eastern Resource Office of The Nature Conservancy. [accessed 6 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.
- [USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

ARTHUR KILL

Arthur Kill Terminal on Staten Island, New York – 40°38'25.23"N, 74°11'23.46"W

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024].

<https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

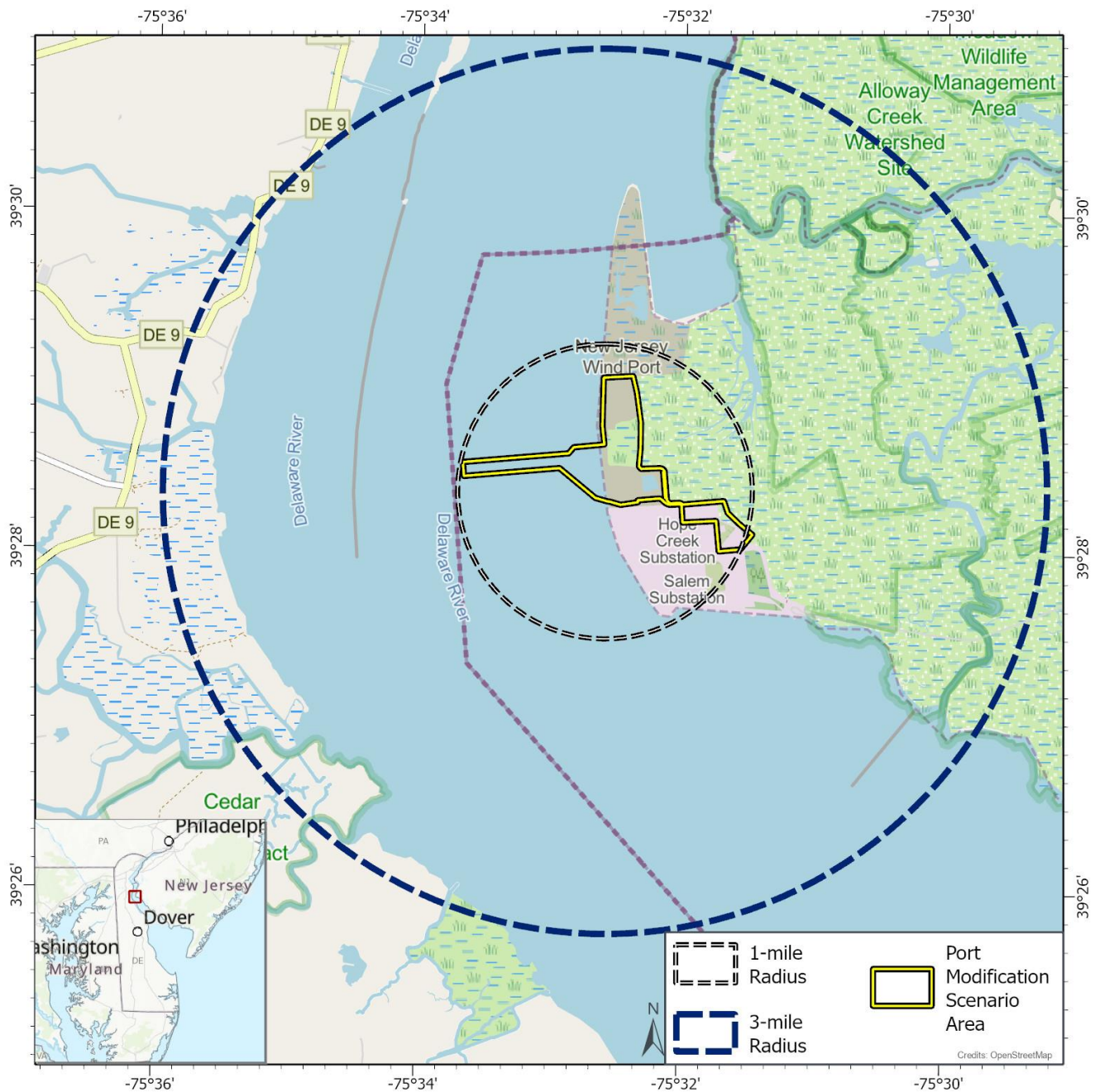
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

NEW JERSEY WIND PORT PORT PROFILE

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N,
76°28'45.06"W

Bureau of Ocean Energy Management

December 18, 2024



NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

1 Port Overview

Owner:	PSEG Nuclear, LLC (Memija 2023)
Operator:	Ørsted North America via New Jersey Economic Development Authority (NJEDA) (Memija 2023)
Primary Existing Uses:	Undeveloped
Primary Existing Cargo:	None
Existing Port Employment:	None
Typical Operating Hours:	None
Terminal Land Area:	200+ acres (Memija 2023)
Closest Wind Energy Lease Area:	GSOE I, LLC (OCS-A 0482)
Distance to Closest Lease Area:	Approximately 76 nautical miles
Potential Offshore Wind Port Uses:	Marshalling and manufacturing (New Jersey Wind Port 2024)

The New Jersey Wind Port (NJWP) will be the first purpose-built port on the East Coast of the United States (New Jersey Wind Port 2024). The NJWP is located at a former greenfield site on the eastern shore of the Delaware River in Lower Alloways Creek, Salem County, New Jersey, north of the Salem Nuclear Power Plant. The site is adjacent to the Delaware River federal navigation channel and has no air draft limitations at the site or between the site and the ocean.

The NJWP is being developed by the NJEDA on behalf of the state of New Jersey. Construction at the site began in September of 2021 and is expected to be completed in 2029 (New Jersey Wind Port 2024). Danish developer Ørsted North America (Ørsted) signed an agreement with the NJEDA to develop the site and use the port as a staging and support area for the Ocean Wind 1 project (Memija 2023). The Bureau of Ocean Energy Management (BOEM) analyzed the environmental impacts of port use in relation to that project in the *Ocean Wind 1 Offshore Wind Farm Final Environmental Impact Statement* (BOEM 2023a). The NJWP site has been divided into seven separate sections that are being developed in two phases (Lewis 2022).

In 2023 it was announced that, due to economic pressures, Ørsted was pulling out of two contracts to develop planned offshore wind projects (Ocean Wind 1 and Ocean Wind 2) (Rodas and Johnson 2023); however, construction has continued at the NJWP, and two new wind developers (Attentive Energy and Leading Light Wind) have committed to marshaling and shipping out wind component infrastructure from the NJWP (Rodas 2024).

Existing capabilities are summarized in Table 1-1.

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	840 (National Oceanic and Atmospheric Administration [NOAA] 2018)
	Port Access Channel Controlling Depth (feet)	40 (NOAA 2018)
	Overhead / Air Draft Restriction (feet)	Unlimited (NJEDA 2020)
	Number of Berths	None (undeveloped)
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	n/a (undeveloped)
	Length (feet)	n/a
	Depth (feet)	n/a
	Suitable for Spud-Jacking (Yes/No)	Yes (NJEDA 2020)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	0
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	n/a
	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	n/a (undeveloped)

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Capability Area	Criteria (Units)	Value
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	n/a (undeveloped)
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	n/a
	Height Restrictions (Yes/No)	No (NJEDA 2020)
Transportation	On-Site Rail (Yes/No)	n/a (undeveloped)
	On-Site Highway (Yes/No)	n/a (undeveloped)

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for the NJWP is presented in *The New Jersey Wind Port - Technical Information for Offshore Wind Developers and Component Manufacturers*, an NJEDA technical information document prepared in October 2020 (NJEDA 2020). The NJWP is being developed in two phases. Construction began in 2021 and is expected to be completed in 2029.

Phase 1, planned to be completed in 2024, includes dredging a channel and turning basin to approximately 32 feet below mean lower low water (NJEDA 2020); constructing a heavy-lift quay with two berths dedicated to delivery and installation; developing a 30-acre marshalling area for component assembly and staging; and constructing overland heavy-haul transportation corridors for safe maneuvering of components such as nacelles, towers, and blades (New Jersey Wind Port 2024). Quayside areas will be designed to have a high live load-bearing capacity of 6,200 psf and laydown areas are planned to accommodate a 4,800 psf ground-bearing capacity to support the heavy loads (NJEDA 2020).

Under Phase 2, two areas that could be used for additional staging or for manufacturing will also be developed, including an additional 35-acre marshalling area and a potential manufacturing parcel that occupies approximately 70 acres (New Jersey Wind Port 2024).

Modifications required to provide sufficient access to the proposed quays under Phase 1 of construction include dredging an approach channel and turning basin to a proposed depth of approximately 32 feet below mean lower low water. Based on the area (approximately 90 acres), the proposed dredge depth of 32 feet, and the existing depths within the proposed dredge footprint (NOAA 2018), it is estimated that nearly 2.5 million cubic yards of dredging may be required. Dredging is expected to be performed via mechanical means. Following dewatering and dredged material stabilization, the dredged material may be used on-site for fill or for surcharging upland areas for soil compaction.

Within the dredge footprint, a 680-foot-long area adjacent to the heavy lift quay, assumed for this analysis to be 100 feet wide, would be prepared for use as jack-up vessel pad. Modifications required to construct the jack-up pad include over-dredging by 10 additional feet within the approximately 1.6-acre footprint and backfilling with a layer of gravel (NJEDA 2020).

Modifications required to construct the two proposed quays under Phase 1 of construction (inbound and outbound), which combined have a total length of 2,800 linear feet after both phases of construction (NJEDA 2020), would include the driving of steel piles and a sheet pile wall, filling and compaction of aggregate, and the construction of a steel rebar supported concrete deck. The quays will be constructed to have a live load-bearing capacity of 6,200 psf (NJEDA 2020).

Modifications required to prepare the upland portion of the site under both Phases 1 and 2, which consists of approximately 70 total acres of marshaling area and 100 acres of laydown or manufacturing space include land clearing and grading, potentially including using processed dredged material as fill. A surcharge load will be placed onto the graded surface for compaction of soils to achieve the target 4,800 psf bearing capacity (Lewis 2022).

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Following removal of the surcharge load, the ground surface would be leveled and topped with a layer of dense graded aggregate (DGA) as the final surface (NJEDA 2020). No permanent buildings or foundations are planned to be constructed in advance (NJEDA 2020).

Modifications required to construct haul roads between the quays and the marshaling and laydown areas would include land clearing, grading, and placement of surcharge loads to improve the ground bearing capacity to 4,800 psf, followed by paving (NJEDA 2020). Development would also include the construction of electrical, water, communications, stormwater, and sanitary utilities (NJEDA 2020). Additional minor modifications would include security improvements (e.g., fencing, gates, lighting and signage).

As noted, the NJWP has no air-draft restrictions on-site or between the site and the open ocean.

The primary impact driver during operation would be the emissions and disturbance generated by ships calling at the port, an increase in local terrestrial cargo transportation, and the presence and activities of workers at the port (i.e., because the proposed NJWP site is currently undeveloped, all new activity would represent an increase).

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Salem County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Salem County, New Jersey, includes urban areas with a low to moderate population density and a sizable industrial base. Emission sources within the boundaries of Salem County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Salem County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with emissions from specific industrial facilities being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023a). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Salem County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	598	119	20	4	–
Biogenics*	515	214	–	–	–	6,001	431	–
Dust	–	–	–	1,1681	138	–	–	–
Fires	63	5	2	8	8	9	2	70
Fuel Combustion	403	119	2	58	57	55	17	–
Industrial Processes§	–	–	–	–	–	23	–	–
Miscellaneous†	32	1	–	33	30	713	80	–
Mobile	4,877	831	9	50	31	414	123	425,092
Point-Sources	238	572	597	144	127	112	21	961,288
Total	6,128	1,742	610	2,052	510	7,347	678	1,386,450

Source: EPA (2023a).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. Salem County is in nonattainment of the National Ambient Air Quality Standard (NAAQS) for the 2008 and 2015 8-hour ozone.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

The county is also in maintenance for the 1971 CO standards (EPA 2024a). Therefore, the General Conformity Rule is applicable (EPA 2023b).

Salem County is currently classified as marginal for the 2008 8-hour ozone and serious for the 2015 8-hour ozone standards; therefore, NO_x will be evaluated as a precursor of O₃. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Salem County reported an O₃ design value of 66.3 parts per billion (ppb) on average for the 2019 to 2021 period, 66.7 ppb on average for the 2020 to 2022 period, and 67.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 1 year.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area under development would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	26.14	50.07	0.10	2.04	1.28	1.24	–	10,398.58
Nonroad Emissions	10.44	31.53	0.04	1.88	1.69	1.64	0.92	14,828.37
On-Road Emissions	84.84	6.19	0.06	1.09	12.70	3.11	0.30	8,728.76
Fugitive Dust	–	–	–	–	61.79	6.18	–	–
Total	121.42	87.79	0.20	5.01	77.46	12.17	1.22	33,955.71
Conformity De Minimis levels¹	100	50	–	50	–	–	–	–

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

¹ De Minimis levels for Serious nonattainment for the 2015 8-hour ozone standard, and maintenance for the 1971 CO standard. VOC De Minimis level for nonattainment areas within an ozone transport region.

Based on preliminary calculations, air emissions from dredging expansion could significantly add to existing emissions, surpassing the NO_x Conformity De Minimis levels as shown in Table 2-2. Port-specific air quality analyses and monitoring, based on final designs and construction plans, would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long-term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.01	0.57	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	1.17	0.09	<0.01	0.02	0.19	0.05	<0.01	122.77
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.10
Total	1.21	0.77	<0.01	0.04	0.20	0.06	<0.01	368.26
Conformity De Minimis levels¹	100	50	–	50	–	–	–	–

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

¹ De Minimis levels for Serious nonattainment for the 2015 8-hour ozone standard, and maintenance for the 1971 CO standard. VOC De Minimis level for nonattainment areas within an ozone transport region.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 77.52 kilometers. While the airshed is currently in attainment or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from dredging during construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: Review of confidential and publicly available reference sources identified one previously documented cultural resource within a 3-mile radius of the NJWP. The resource, the Alloway Creek Rural Historic District, is listed on the State Register of historic resources of New Jersey (New Jersey Geographic Information Network [NJGIN] 2024). This resource was also determined to be eligible for the NRHP at the federal level as a National Historic District for the period of significance from 1695 to 1900 (National Park Service [NPS] 2024; NJGIN 2024).

The NJWP is situated on Artificial Island along the eastern shore of the Delaware River. The NJWP is sited by the Delaware-New Jersey state line to the north, the Delaware River to the west, and the Alloway and Hope Creeks to the east within Lower Alloway Creek Township, Salem County, New Jersey. The Hope Creek Generating Station and the PSEG Salem Nuclear Power Plant are located at the southern boundary of the NJWP site (Google Earth 2024). Otherwise, the lands and riverine areas surrounding the NJWP and westward across the Delaware River are all undeveloped wildlife areas, including the Abbott Meadows and Mad Horse Creek wildlife areas on the New Jersey side and the Augustine, Silver Run, Appoquinimink, and Cedar Swamp wildlife areas on the Delaware side (Google Earth 2024).

The PSEG Salem Nuclear Power Plant was completed and began generating power in 1976 and supplying electricity in 1977, after ground was first broken for its construction in 1968 (Namiotka 2016; Power Technology 2024). Salem 1 is a Generation II (or commercial power) nuclear reactor for which PSEG served as the architect-engineer. Its pressurized-water reactor system was supplied by Westinghouse Electric; the alloyed steel (ASTM A 533/508) reactor vessel was supplied by Combustion Engineering; and the civil works were carried out by United Engineers & Constructors (Power Technology 2024). Built adjacent to the Salem 1 site starting in 1974, Hope Creek Generating Station Unit 1 came online in 1986 and is a Generation II General Electric Type 4 advanced boiling water reactor (U.S. Nuclear Regulatory Commission 2024).

Three structures appear to exist within the NJWP site, with a fourth no longer extant (Google Earth 2024). To the southeast are two industrial-appearing buildings (with rectangular footprints) adjacent to the Hope Creek Generating Station and the PSEG Salem Nuclear Power Plant and seem to be from the era of and related to development of those facilities. To the north and across the road from the PSEG Salem Nuclear Power Plant cooling tower is another industrial building with an L-shaped footprint that was constructed between 2005 and 2006, with a smaller outbuilding and lattice tower structure added to its northwest in the same time period (these associated structures are still present). The L-wing expansion was added to the southeast of the building between 2011 and 2015 (Google Maps 2024). Directly north of this building, at the other end of the cleared, graded area, was another squarish structure removed between 2005 and 2006 (Google Maps 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Pre-Contact, Contact, and Post-Contact Native American archaeological resources are known to occur in the adjacent Mad Horse Creek Wildlife Management Area to the east of the NJWP, where wetland and older soils may persist undisturbed by historic and recent industrial and port developments. These disturbances may have occurred either onshore within the wetlands, along the riverbank, or in submerged areas near the riverbank (BOEM 2023b; NJGIN 2024). Multiple archaeological sites are recorded immediately outside the 3-mile search radius (Lattanzi 2024; NJGIN 2024). However, the artificial island supporting the NJWP is unlikely to contain archaeological materials in undisturbed contexts.

Marine Archaeological Resources: Three submerged wrecks of unknown age were identified to the west and south of the modification scenario area within a 3-mile radius (NOAA 2024a). These locations may represent submerged cultural resources greater than 50 years of age and may be NRHP-eligible. Multiple submerged obstructions of unknown age are also situated within a 3-mile radius (NOAA 2024a). In 2009, a submerged cultural resources remote sensing survey was conducted as part of a PSEG Early Site Permit Application and encompassed approximately 100 acres off the western shore of Artificial Island in the Delaware River. Multiple clusters of magnetic and sonar anomalies were detected, but no additional investigation regarding NRHP eligibility was conducted (Panamerican Consultants, Inc. 2009).

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Aboveground Historic Resources: Previous BOEM (2023b) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those being considered for port developments in this setting. Beyond the Hope Creek Generating Station and the PSEG Salem Nuclear Power Plant, the NJWP is being constructed on Artificial Island located along the eastern shore of the Delaware River. Isolated trees and shrubs are found along the western edge of the site, which opens on to the river and is mostly surrounded by and opposite the wildlife areas (Google Earth 2024). Beyond the wildlife areas are farms connected by town centers and radiating road networks. The boundary of the Alloway Creek Rural Historic District extends from the banks of the Delaware River between Salem and Hope Creeks, and inclusive of the Alloway Creek system; however, all associated farms are located more than 3 miles from the NJWP site. Within the historic district, the Abel and Mary Nicholson House National Historic Landmark (127 Fort Elfsborg–Hancock Bridge Road) is 4 miles northwest of the nearest edge of the NJWP site.

Cultural Resources Potential: Historic topographic map review indicates that Artificial Island in the Delaware River channel was constructed by 1946. Subsequent mapping and aerial imagery indicate no buildings or structures have been constructed to completion in the past 50 years within a 1-mile radius. Historic topographic maps identify an early power plant, constructed in the 1940s, and the extant nuclear power plant to the south of the NJWP that began construction in the late 1960s (U. S. Geological Survey [USGS] 2024a). Notably, no aboveground historic structures were associated with the NRHP-eligible Alloway Creek Rural Historic District at the state level (NJGIN 2024; NPS 2024). However, the State Historic Preservation Office expanded the district's boundaries in 2015, adding three properties and extending the district's period of significance from 1870 to 1900 (New Jersey Historic Preservation Office [NJHPO] 2024).

No terrestrial archaeological sites were identified within a 3-mile radius based on confidential and publicly available reference sources (Lattanzi 2024; NJGIN 2024; NJHPO 2024; NPS 2024). Unknown terrestrial archaeological sites are of low potential in the modification scenario area or surrounding developed areas due to the artificial nature of the underlying land and the existing ground and shoreline disturbances. However, cultural resources could occur adjacent in more deeply buried terrestrial and riverbank deposits along the original shoreline, or in undisturbed natural areas (wetlands, riparian zones, beaches). Port modifications could affect these terrestrial soils or sediments.

No marine archaeological sites were identified in the waters proximate to the modification scenario area, based on available sources (NOAA 2024a). Other unknown marine archaeological sites could occur in riverbed sediments or buried paleosols that are largely undisturbed by previous dredging, excavation, or riverbank erosion. Port modifications could affect submerged sediments, which could represent previously undeveloped surfaces of higher capability of retaining buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the port. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,16,19}	- Situated on the Delaware river adjacent to an existing industrialized area; otherwise surrounded by undeveloped land, comprising herbaceous wetlands and tidal saltwater marshes. - The northern half of the modification scenario area is bermed to create upland habitat, separating it from the tidal saltwater marshes, fed by tributaries of the Delaware River. Drainage pathways and canals have been constructed within the modification scenario area. - A nuclear power facility is within 0.25 mile of the modification scenario area.
Shoreline Habitats ⁴	- Within the NJWP site, saltwater marshes are the predominant shoreline category. - To the south, shorelines are human made/armored and riprap.
Submerged Marine Habitats ^{13,14}	- Benthic substrate is a combination of silt/mud, sand, and gravel pockets. - No shellfish habitat or submerged aquatic vegetation found within 3 miles of the modification scenario area.
Designated Habitats / Places ^{2,3,5,6,7,8,15,19}	- Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies. - Habitat Area of Particular Concern for the summer flounder is located at the port location 1 Important Bird Areas found within 1 mile of modification scenario area; three Important Bird Areas Found within 3 miles of modification scenario area. - Critical Habitat, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{5,17}	- Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. - Eastern Black Rail: Marsh habitat within 1 mile. - Rufa Red Knot: Within 1 mile, only for proposed new or changed petroleum product storage or transport, and for spill response planning. No other activity types are expected to affect rufa red knots in this area. - Bog Turtle: Within 3 miles, activity is in a supporting watershed for known/suspected bog turtle habitat. Consultation recommended only for activities involving significant changes to surface/groundwater, including stormwater. - Swamp Pink: Marsh/ wetland habitat located within 1 mile - Sensitive-Joint Vetch: Marsh habitat within 1 mile. - Atlantic and shortnose sturgeon may occur within 1 mile - Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile
Migratory Birds and Eagles ¹⁷	Bald eagles, along with 27 species of migratory birds (some with state protections) have suitable habitat within 1 mile.
Marine Mammals ⁸	Harbor porpoises and Atlantic bottlenose dolphins may be present near modification scenario area.
State Specific Resources ^{9,10,11,12}	Delaware Bayshore Marshes Conservation Focal Area and Mad Horse Creek Wildlife Management Area found within 1 mile.

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021; ²National Audubon Society 2024; NOAA 2021; ⁴NOAA 2022a; ⁵NOAA 2022b; ⁶NOAA 2023a; ⁷NOAA 2023b; ⁸NOAA 2023c; ⁹New Jersey Department of Environmental Protection (NJDEP) 2017; ¹⁰NJDEP 2018; ¹¹NJDEP 2023; ¹²NJDEP 2024; ¹³The Nature Conservancy (TNC) 2010; ¹⁴TNC 2019; ¹⁵U.S. Fish and Wildlife Service (USFWS) 2023a; ¹⁶USFWS 2023b; ¹⁷USFWS 2024; ¹⁸U.S. Geological Survey (USGS) 2022; ¹⁹USGS 2024b.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

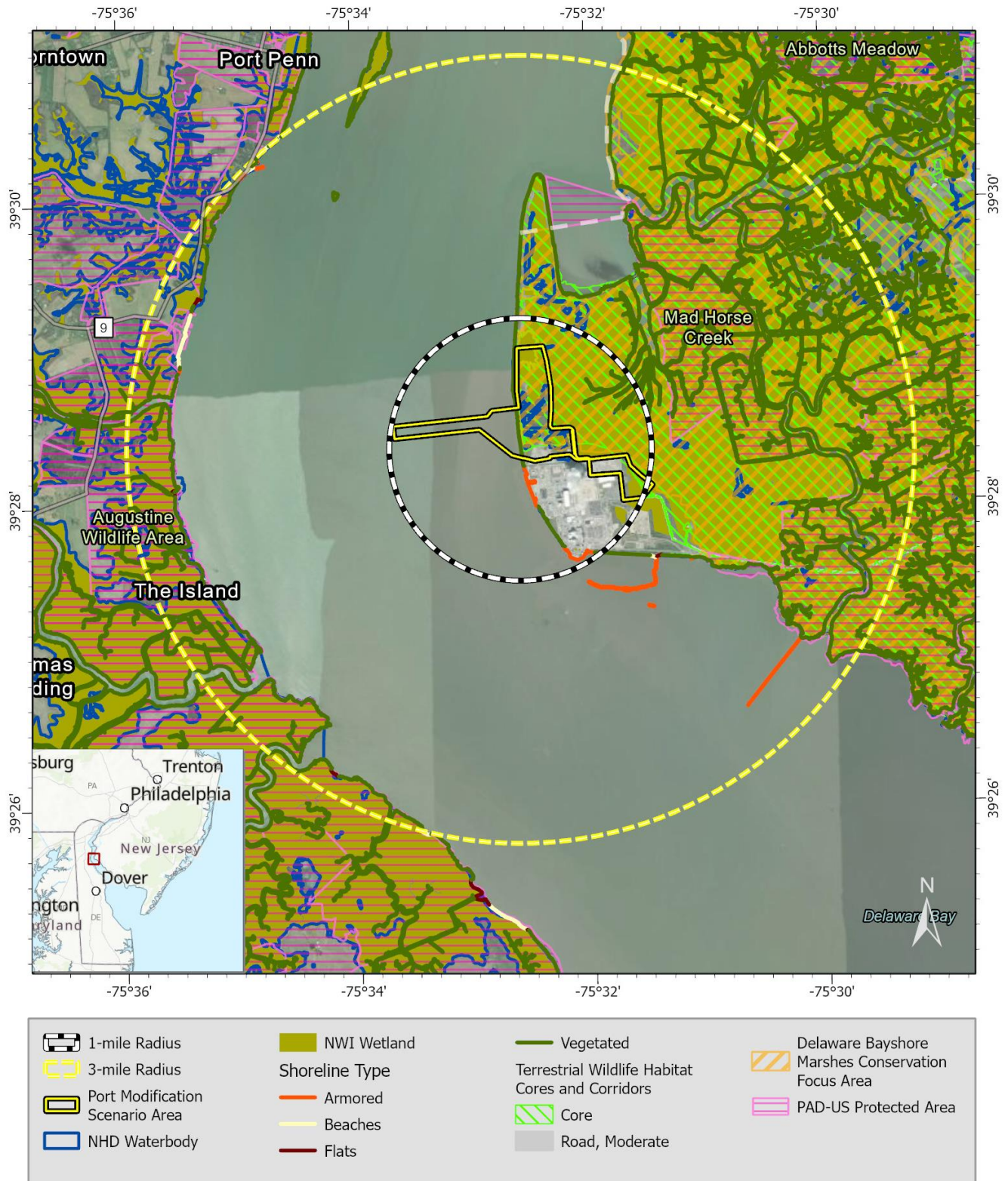


Figure 4-1. Existing habitats and natural resource areas.

Sources: NJDEP 2017, 2018; NOAA 2024b; USFWS 2023b; USGS 2022, 2024b. Base map: Esri World Imagery.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Sediment disturbance, suspension, and deposition due to dredging of approximately 90 acres of substrate for new berth construction.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of ~205 acres due to clearing and aggregate laydown for construction of wharves and marshaling areas, construction of laydown areas, and construction of roads and parking lots.
Onshore Aquatic Habitats	None	Based on review of current imagery, onshore aquatic habitats appear to have been previously disturbed and converted to uplands. Therefore, no onshore aquatic impacts are anticipated.
Shoreline	Habitat alteration	Permanent loss of marsh shoreline within the modification scenario area.
Submerged Marine Habitats / Benthic Resources	Sediment suspension and deposition; habitat alteration	Temporary disturbance of ~90 acres of benthic habitat and resources due to dredging for new berth construction. Permanent loss of ~3 acres of benthic habitat and resources due to dredging and placement of gravel for jack-up pad.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances; however, acoustic impacts during operations would be consistent with existing adjacent land use.
Other Terrestrial Biota	Terrestrial noise	Temporary acoustic impacts to surrounding biota; however, minimal habitat exists to support terrestrial biota within 1 mile. Acoustic impacts during operations would be consistent with existing adjacent land use.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the NJWP is primarily natural, conservation land and residential, with industrial uses immediately adjacent to the NJWP site. Part of the site is already cleared but undeveloped, while the rest is natural wetland and marshland (Esri 2023).	4.7 acres modified for construction of wharves and placement of DGA for surface layer. 71.4 acres modified for construction of marshaling area and placement of DGA for surface layer.	Alteration of natural buffers increases vulnerability to storm surges and flooding, with potential socioeconomic impacts on local communities due to increased erosion, altered drainage, and loss of natural resource availability. However, the buffering capabilities in surrounding areas, which feature similar land use, are likely to be sufficient and would reduce socioeconomic impacts. No anticipated further changes to land use after construction.
Infrastructure	The Wilmington Airport is the closest airport and more than 5 miles away. The nearest interstates are US-1 and I-95, which are both more than 5 miles from the NJWP. The only highway within 5 miles of the port is NJ-43. There is no rail within 5 miles (Esri 2023).	None – local infrastructure unaltered.	In the proposed port modification scenario, existing infrastructure would be unaltered.
Special Use Areas	There are no active military use areas within 5 miles of the port (ArcGIS Online 2020).	None.	In the proposed port modification scenario, special use areas would not be affected.
Visual	The port property and equipment are not generally visible from nearby residential and recreational areas due to intervening landscape and distance from the port (Google Maps 2024).	Up to 300-foot barge-mounted cranes during construction; cranes, stored tower components, lights, and vessel activity during operation.	Port location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to 70 decibels. The highest noise is along the highway (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise dissipates within 0.5 mile, well before reaching the nearest residential areas.
Air Quality	The EPA reports 1 of 5 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Toxic releases to air are in the 68th percentile nationally. Asthma risk is in the 33rd percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 22nd percentile nationally.	Project-related congestion.	Up to 200 additional personal vehicles per day could potentially materially impact traffic patterns during construction. The creation of up to 1,500 new jobs during operation will likely materially impact local traffic patterns, given the relatively low population of 6,288 within a 5-mile radius of the port modification (a 23.9% increase).

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Maritime Navigation	The nearest marine highways include the Delaware Bay and the Chesapeake and Delaware Canal (USDOT 2018).	Increased maritime traffic.	The modification scenario area is currently not in use and the additional maritime traffic will not be material relative to the high volume of maritime traffic passing through the nearest maritime highways.
Commercial Shipping	The port modification area is currently undeveloped. Adjacent port activity is centered around nuclear power (Google Maps 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	NJWP is not a top U.S. commercial fishing port (NOAA 2022c). Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	NJWP is not a recreational fishing port. There are several recreational deep-sea fishing charters that move in and out of Delaware Bay. There are numerous onshore recreational fishing locations within 1 mile of the port. Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with regions of popular recreational fishing use, and there are plentiful options for recreational fishing nearby. Although the site is close to popular areas, the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	There are parks/protected areas, including state parks, state and private conservation land, and federal marine protected areas, within 5 miles of the port. A local beach is located north of the port (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters during construction and operation. Tall cranes and tower components may be visible from recreational areas. Additionally, increased port traffic could increase traffic congestion at nearby recreational areas.
Tourism	230,663 persons (7.4% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	The addition of up to 200 workers during construction may increase congestion at nearby recreational areas. The addition of up to 1,500 new workers during operation may materially impact traffic and congestion at nearby recreational areas and/or bring a material change in business to local businesses and tourist attractions.
Housing and Lodging	38,045 of the 150,427 vacant housing units in the MSA are available for rent. Numerous hotels/motels are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 6,288 within 5 miles of the port and is relatively low density. The population within the MSA is 6.2 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The up to 200 workers during construction would not materially increase the MSA population. The creation of up to 1,500 new jobs during operation could draw workers to the MSA; the effect would be immaterial to a 6.2-million-person population.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Labor Force and Employment	The civilian labor force of the MSA is 3.3 million and employment is 3.1 million. The unemployment rate is 6.1% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 200 workers would not materially increase the labor force of 3.3 million or decrease unemployment.
Income Levels	The per-capita income is \$47,051 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of up to 200 workers during construction and up to 1,500 during operation at prevailing wage levels would not materially alter income levels in a 3.3-million-person labor force with 6.1% unemployment.
Community Cohesion	The county containing the modification scenario area (Salem County) ranks in the 52nd percentile on the national Community Cohesion Index, as reported by Chetty et al. (2022). The three adjacent counties show below-median cohesion, with Community Cohesion Index percentiles of 4, 24, and 32, respectively.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2023 total revenue for Rhode Island was \$51.3 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports no hospitals or schools are within 5 miles of the port. The nearest hospital is about 8 miles away, and the nearest school is about 5.25 miles away. 27.2% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	While the local resources may experience some strain, the robust resources of the major metropolitan areas within the MSA are well-equipped to handle any increased demand. Population levels and the risk of large-scale industrial accidents are expected to remain largely unchanged.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023a. Ocean Wind 1 Offshore Wind Farm Final Environmental Impact Statement. OCS EIS/EA BOEM 2023-020. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 20 September 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Ocean_Wind1_FEIS.pdf.
- [BOEM] Bureau of Ocean Energy Management. 2023b. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- [EPA] U.S. Environmental Protection Agency. 2023a. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2023b. General Conformity – De Minimis Tables. [updated 29 June 2023; accessed 11 May 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – New Jersey Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_nj.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 39°12'44.06"N, 76°28'45.06"W. Street View. [accessed 9 May 2024].
- Lattanzi GD. Curator and State Archaeologist, New Jersey Historic Preservation Office. Email conversation, 22 August 2024.
- Lewis AS. 2022. NJ's Massive Wind Port is Taking Shape. *New Jersey Spotlight News* Nov 30. [accessed July 2024]. <https://www.njspotlightnews.org/2022/11/new-jersey-wind-port-takes-shape-in-salem-county-offshore-wind-industry-hub/>.
- Memija A. 2023 Jul 31. Ørsted to Become First Tenant of New Jersey Wind Port. offshoreWIND.biz. [accessed July 2024]. <https://www.offshorewind.biz/2023/07/31/orsted-to-become-first-tenant-of-new-jersey-wind-port/>.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

Namiotka J. 2016. Salem at 40: Four Decades of Nuclear in New Jersey. [accessed 10 September 2024]. <https://energizepseg.com/2016/12/20/salem-at-40-four-decades-of-nuclear-in-new-jersey/>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

New Jersey Wind Port. 2024. The New Jersey Wind Port. [accessed June 2024]. <https://njwindport.njeda.gov/>.

[NJDEP] New Jersey Department of Environmental Protection. 2017. Conservation Focal Areas Version 1.1, Delaware Bay Landscape Region in New Jersey. [accessed 8 May 2024]. <https://gisdata-njdep.opendata.arcgis.com/maps/fc6b73fd8670436a9d672981aa5006bc/about>.

[NJDEP] New Jersey Department of Environmental Protection. 2018. Terrestrial Wildlife Habitat Cores and Corridors in New Jersey, Connecting Habitat Across New Jersey (CHANJ). [accessed 8 May 2024]. <https://gisdata-njdep.opendata.arcgis.com/maps/bee8b65301514b67a3750afbad9dfeca/about>.

[NJDEP] New Jersey Department of Environmental Protection. 2023. Natural Heritage Priority Sites in New Jersey. [accessed 8 May 2024]. <https://gisdata-njdep.opendata.arcgis.com/maps/0aaefb4a68ba4fac824b31d4c59578fe/about>.

[NJDEP] New Jersey Department of Environmental Protection. 2024. NJDEP Land Resource Protection (LRP) Bureau of Tidelands Polygon Activity Features in New Jersey. [accessed 8 May 2024]. https://gisdata-njdep.opendata.arcgis.com/datasets/2476f16e5b1c428ba9a3b4b2eeeb23e2_127/explore?location=39.553768%2C-75.514597%2C10.00.

[NJEDA] New Jersey Economic Development Authority. 2020. The New Jersey Wind Port - Technical Information for Offshore Wind Developers and Component Manufacturers. [available in record; last accessed August 2024]. <https://nj.gov/windport/about/pdf/NJWPTechnicalInformationPackage.pdf>.

[NJGIN] New Jersey Geographic Information Network. 2024. New Jersey Geographic Information Network. [accessed 10 September 2024]. <https://njgin.nj.gov/>.

[NJHPO] New Jersey Historic Preservation Office. 2024. Identification of Historic Resources. [accessed 10 September 2024]. <https://www.nj.gov/dep/hpo/1identify/identify.htm>

[NOAA] National Oceanic and Atmospheric Administration. 2018. Chart No. 12312. 58th ed. Last correction 22 January 2024.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. Delaware Bay (Delaware, New Jersey, and Pennsylvania), 2014 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/53986>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

[NOAA] National Oceanic and Atmospheric Administration. 2022c. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. <https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344::>.

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Panamerican Consultants, Inc. 2009. *Submerged Cultural Resources Survey of a Proposed Barge Facility and Water Intake, PSEG Early Site Permit Environmental Review, Delaware River, Salem County, New Jersey*. [accessed 10 September 2024]. <https://www.nrc.gov/docs/ML1016/ML101660433.pdf>.

Power Technology. 2024. Power plant profile: Salem 1, US. [accessed 10 September 2024]. <https://www.power-technology.com/data-insights/power-plant-profile-salem-1-us/>.

Rodas S. 2024 Mar 26. Offshore Wind Ports Took a Hit When Developers Pulled Out. NJ.com. [updated 27 March 2024; accessed July 2024]. <https://www.nj.com/gloucester-county/2024/03/offshore-wind-ports-took-a-hit-when-developer-pulled-out-why-nj-is-still-hopeful.html>.

Rodas S and Johnson B. 2023 Oct 31. Developer Cancels Plans for 2 N.J. Offshore Wind Farms. NJ.com. [updated 1 November 2024; accessed July 2024]. <https://www.nj.com/news/2023/11/developer-cancels-plans-for-2-nj-offshore-wind-farms-including-1st-planned-for-state.html>.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston: Eastern Resource Office of The Nature Conservancy. [accessed 4 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.

NEW JERSEY WIND PORT

New Jersey Wind Port in Lower Alloways Creek, New Jersey – 39°12'44.06"N, 76°28'45.06"W

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 4 May 2024].

https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

U.S. Nuclear Regulatory Commission. 2024. Hope Creek Generating Station, Unit 1. [accessed 10 September 2024].

<https://www.nrc.gov/info-finder/reactors/hope.html>.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024].

<https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for Connecticut. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed 7 June 2024].

<https://fred.stlouisfed.org/series/QTAXTOTALQTXCAT3CTNO#0>. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024].

<https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024a. National Map Historic Topographic Maps Collection (HTMC). [accessed 10 September 2024]. <https://ngmdb.usgs.gov/topoview/viewer/#4/40.01/-99.93>.

[USGS] U.S. Geological Survey. 2024b. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

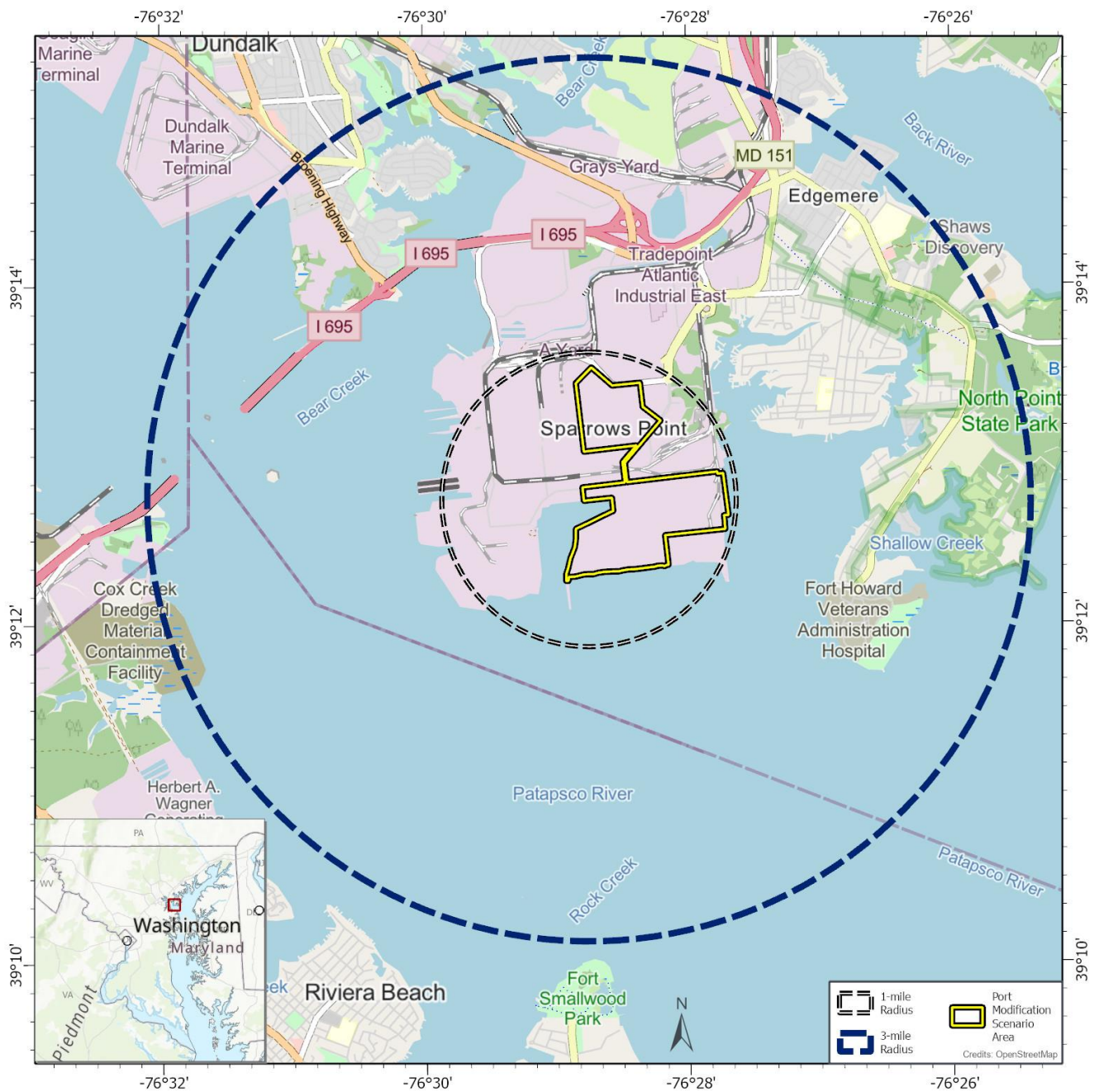
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

BALTIMORE PORT PROFILE

Tradepoint Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Bureau of Ocean Energy Management

December 18, 2024



BALTIMORE

Tradepoint Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

1 Port Overview

Owner:	Tradepoint Atlantic (Ports America 2024)
Operator:	Ports America Chesapeake (stevedoring operations) (Ports America 2024)
Primary Existing Uses:	Cargo, stevedoring, manufacturing (Tradepoint Atlantic 2024)
Primary Existing Cargo:	Bulk, breakbulk, Ro/Ro, project cargo, offshore wind products (Tradepoint Atlantic 2024)
Existing Port Employment:	Over 530 (US Wind 2024)
Typical Operating Hours:	4:30 a.m. to 9:00 p.m. (Tradepoint Atlantic 2024)
Terminal Land Area:	3,300 acres (Tradepoint Atlantic 2024)
Closest Wind Energy Lease Area:	Virginia Electric and Power Company (OCS-A 0483)
Distance to Closest Lease Area:	Approximately 189 nautical miles
Potential Offshore Wind Port Uses:	Manufacturing and Assembly (Energy Central 2023)

The Tradepoint Atlantic (TPA) site is located at Sparrow’s Point on the eastern side of Baltimore Harbor, in Baltimore, Maryland. It occupies over 3,300 total acres (Tradepoint Atlantic 2024), of which approximately 1,000 acres has been reserved for marine-related activities, including 900 acres set aside for offshore wind development (Tradepoint Atlantic 2021). The existing TPA site has three vessel berths, including a 2,200-linear-foot berth (the “inner berth”) with a maintained depth of 38 feet and a 1,150-linear-foot finger pier with a maintained depth of 43 feet, both of which provide access to Baltimore Harbor’s main shipping channel, which is maintained at a depth of 50 feet (Tradepoint Atlantic 2024).

The TPA site includes an existing roll-on, roll-off (Ro/Ro) terminal, two fixed cranes with lifting capacities of 85 tons, mobile cranes, and self-propelled modular transporters (Tradepoint Atlantic 2024). Approximately 50 miles of on-site class 3 railroad lines provide access to off-site regional class 1 railroad lines. An interstate highway (I-695) runs through the site and provides access to interstates I-95 and I-70 (Tradepoint Atlantic 2024).

The TPA site provides natural gas, electricity, and water, and has a site-specific water treatment plant and industrial water reservoir (Tradepoint Atlantic 2018a). The site also encompasses a dry dock for vessel repairs or construction, warehouses ranging from 50,000 to 100,000 square feet, and 50 acres of existing graded outdoor storage (Tradepoint Atlantic 2024).

In April 2023, Maryland Governor Wes Moore announced an agreement with Ørsted A/S (Ørsted) to develop TPA in order to support Ørsted’s Skipjack offshore wind project, located off the coast of Maryland, which was intended to power over 300,000 homes (Fox News Baltimore 2023). In November 2023, the state of Maryland announced an additional \$47 million in federal funding intended to develop TPA as an offshore wind manufacturing hub, including preparing the future Sparrow’s Point Steel site and upgrades to enable heavy cargo management (Energy Central 2024). The proposed Sparrow’s Point Steel facility, encompassing approximately 90 acres, will be developed in partnership with US Wind in order to manufacture monopiles at the former Bethlehem Steel site, and will generate 530 new jobs (US Wind 2024).

In January 2024, Ørsted announced it would be exiting agreements with the state of Maryland to sell offshore wind power based on current economic viability. While Ørsted is in the process of re-evaluating its projects, US Wind has remained committed to their existing projects, including development of the Sparrow’s Point Steel monopile manufacturing facility and the development of a 22-turbine offshore wind farm off the coast of Maryland, which is expected to be operational in 2025 (Sierra Club 2024).

Existing capabilities are summarized in Table 1-1.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	700 (National Oceanic and Atmospheric Administration [NOAA] 2018)
	Port Access Channel Controlling Depth (feet)	50 (NOAA 2018)
	Overhead / Air Draft Restriction (feet)	None
	Number of Berths	3 (Tradeport Atlantic 2021)
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	14.6 (inner berth) (Tradeport Atlantic 2020)
	Length (feet)	3,350 combined
	Depth (feet)	38 to 43
	Suitable for Spud-Jacking (Yes/No)	Unknown (site not assessed) (Elkinton et al. 2014)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	50
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	14.6 (Tradeport Atlantic 2021)
	Haul Route Area Bearing Capacity (mt/m ²)	14.6 (Tradeport Atlantic 2021)
	Approx. Size of Covered Storage Area (acres)	Up to 2.3
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	Yes
	Width of Ro/Ro Berth (feet)	60 (Google Earth 2024)
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	14.6 (Tradeport Atlantic 2021)
Cranes	Lifting Capacity (mt)	85
	Height Restrictions (Yes/No)	No (NOAA 2018)
Transportation	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	Yes

Source: Tradeport Atlantic 2024, unless otherwise indicated.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for TPA site development to support offshore wind is presented in factsheets developed by Tradeport Atlantic in 2018 and 2021 (Tradeport Atlantic 2018b, 2021). The proposed development of the site also includes construction of a monopile manufacturing facility over 90 acres of the site as described in US Wind's 2024 press release (US Wind 2024).

The proposed TPA site development includes site clearing and grading to match the existing uniform heavy lift capability of 3,000 psf across the quayside and upland areas. Redevelopment of the existing Ro/Ro berth is planned for transfer of heavy wind components from barges and heavy lift vessels (Tradeport Atlantic 2021). Adjacent to the inner berth and Ro/Ro berth, approximately 10 acres will be set aside for quayside operations, including use of mobile cranes. approximately 115 acres of laydown areas would be constructed as well as redevelopment of the three existing berths for use to support offshore wind, including the Ro/Ro berth, inner berth, and the finger pier berth (Tradeport Atlantic 2024).

Although specific details are not provided in the concept documents, it is assumed that modifications required to redevelop the proposed quays would include grading, dumping, and compaction of fill and aggregate (likely dense graded aggregate [DGA]), which is consistent with other wind port buildouts. The final surface would be either a layer of DGA or pavement. Laydown areas would be connected to the quays and to the manufacturing parcel via redeveloped haul routes, which, as noted, would also have a uniform ground bearing capacity of 3,000 psf (Tradeport Atlantic 2024). It is assumed that existing rail lines would be sufficient to support operations as no additional rail construction is noted in the concept documents.

Modifications required to redevelop the quayside areas are assumed to be similar to those required for storage areas and haul routes, and would include the import, placement, and compaction of fill and DGA to achieve the target

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

uniform ground bearing capacity of 3,000 psf (Tradeport Atlantic 2024). Existing cranes and modular transporters would be used in the quayside areas and there are no additional cranes proposed for construction in the concept documents.

Modifications required to construct the monopile manufacturing facility building would include the demolition and removal of existing structures, site clearing and grading, and construction of a concrete pad for the structure(s). In addition, the manufacturing facility would be connected to the port via upgraded roads and accessways.

Additional modifications noted in the concept documents include improvements to lighting, security fencing, and quayside bollards and cleats (Tradeport Atlantic 2021). It is assumed that dredging would be proposed in the future so that the berth areas (currently maintained to depths of 38 and 43 feet) would be deepened to 40 and 50 feet, respectively, to match the Baltimore main shipping depth of 50 feet (Tradeport Atlantic 2018b).

There are no air draft restrictions associated with the TPA site or between the site and the ocean.

The primary impact driver during operation would be the site's return to approximately the operational tempos that were experienced at the site during Bethlehem Steel operations, which ceased operations in 2012; this would include an increase from existing conditions in ships calling, local terrestrial cargo transportation, and associated worker activities.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Baltimore County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Baltimore County, Maryland, includes urban and suburban areas with a high population density and a sizable industrial base. Emission sources within the boundaries of Baltimore County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Baltimore County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with fuel combustion (from nonmobile sources) being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, highway vehicles, and solvent use in industry (Environmental Protection Agency [EPA] 2023a). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Baltimore County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	263	53	10	2	–
Biogenics*	826	228	–	–	–	9,767	707	–
Dust	–	–	–	6,000	715	–	–	–
Fires	103	2	1	11	10	24	5	1,623
Fuel Combustion	4,817	1,507	1,063	916	723	681	246	–
Industrial Processes§	–	–	–	–	–	10	–	–
Miscellaneous†	5,014	127	47	1,205	1,103	1,048	141	–
Mobile	53,768	5,399	30	556	293	3,415	1,1015	4,194,924
Point-Sources	410	210	11	163	83	280	19	202,684
Total	64,938	7,473	1,152	9,114	2,980	15,235	2,135	4,399,231

Source: EPA (2023a).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. Baltimore County is in nonattainment of National Ambient Air Quality Standards (NAAQS) for the 2008 and 2015 8-hour ozone, and a portion of Baltimore County is nonattainment for the 2010 sulfur dioxide standard. A portion of the County is also in maintenance for the 1971 CO standards (EPA 2024a). Therefore, the General Conformity Rule is applicable (EPA 2023b).

Since Baltimore County is currently classified as moderate for the 2008 and 2015 8-hour ozone, NO_x will be evaluated as a precursor of O₃. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over 3 years. Ambient air quality monitors located in Baltimore County reported an O₃ design value of 70.3 parts per billion (ppb) on average for the 2019 to 2021 period, 68.7 ppb on average for the 2020 to 2022 period, and 70.7 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Construction would occur over 1.5 years.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	3.95	7.57	0.02	0.31	0.19	0.19	–	1,571.88
Nonroad Emissions	4.86	15.15	0.02	0.88	0.79	0.76	0.43	6,959.92
On-Road Emissions	6.28	0.46	<0.01	0.08	0.94	0.23	0.02	645.37
Fugitive Dust	–	–	–	–	76.68	7.67	–	–
Total	15.09	23.19	0.04	1.27	78.60	8.85	0.45	9,177.17
Conformity De Minimis levels¹	100	100	–	50	–	–	–	–

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

¹ De Minimis levels for Moderate nonattainment for the 2008 8-hour ozone and the 2015 8-hour ozone standards, and maintenance for the 1971 CO standard. VOC De Minimis level for nonattainment areas within an ozone transport region.

Air emissions from construction would not likely add appreciably to existing emissions and have been estimated to be less than the applicable conformity de minimis levels. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.18	0.01	<0.01	<0.01	0.03	0.01	<0.01	18.58
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17
Total	0.78	0.63	<0.01	0.02	0.04	0.02	<0.01	263.14
Conformity De Minimis levels¹	100	100	–	50	–	–	–	–

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTPy = metric tons per year.

¹ De Minimis levels for Moderate nonattainment for the 2008 8-hour ozone and the 2015 8-hour ozone standards, and maintenance for the 1971 CO standard. VOC standard for nonattainment areas within an ozone transport region.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the Ro/Ro capability phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 68.7 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct, and indirect impacts on air quality in the region because of emissions from construction; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The TPA modification scenario area is within the Sparrow's Point industrial area in Baltimore County, along the Patapsco River, and includes myriad historic resources (Maryland Historical Trust [MHT] 2024; National Park Service [NPS] 2024). Review of the confidential MHT Medusa Cultural Resource Information System (Medusa) database and publicly available reference sources identified more than 1,300 previously documented cultural resource inventory points consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects across the city of Baltimore (MHT 2024; NPS 2024). These inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal levels (MHT 2024; NPS 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area is the entire TPA site, a 387-acre industrial parcel situated between Old Road Bay on the east and the Marine Channel of the Patapsco River on the west (Google Earth 2024). In this area, known as Sparrow's Point, early settlement by Algonquin-speaking groups along the Atlantic coastline was displaced by European settlement beginning as early as the 1650s (Baltimore Heritage 2024; The Lost Towns Project 2024; MHT 2024). Thomas Sparrow, Jr., his descendants, and other settlers farmed and hunted on the peninsula until 1887, when the parcel was developed as a deep-water port and steel manufacturing area (Baltimore Heritage 2024; Dundalk Patapsco Neck Historical Society & Museum 2017; The Lost Towns Project 2024; MHT 2024). The TPA site includes multiple industrial buildings, warehouses, storage tanks, paved and unpaved areas, wharves, and stockpiles of raw materials (sand, gravel). The modification scenario area is bounded by Shipyard Road to the east and Power House Road to the north and is situated adjacent to additional warehouse and industrial facilities. Isolated stands of trees grow primarily along the water's edge (Google Earth 2024). The Sparrow's Point Channel is situated along the Baltimore Harbor estuary and opens into the Chesapeake Bay (Baltimore City Department of Public Works 2024; Google Earth 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Native American Pre-Contact, Contact, and Post-Contact period and Historic period archaeological sites, are known to occur within a 3-mile radius of the TPA site, with 22 sites identified in the confidential Medusa database (MHT 2024). These archaeological resources include Pre-Contact camp sites and lithic scatters and Historic house foundations, trolley lines, and industrial centers (MHT 2024; NPS 2024). This quantity of archaeological site data indicates an area of low to moderate frequency for archaeological resources.

Within 1 mile of the TPA site, no inventory points of Native American or historic Euro-American character are known (MHT 2024; NPS 2024). One underwater archaeological survey is recorded in the vicinity of Sparrow's Point. Older soils may persist undisturbed within isolated or undeveloped portions of the TPA site that could preserve archaeological resources.

Marine Archaeological Resources: There are 28 identified shipwrecks or submerged obstructions within a 3-mile radius of the TPA; three of these shipwrecks and submerged obstructions are within 1 mile. These 28 marine archaeological resources may include wood or metal obstructions made up of fragments or whole barges, submerged docks, ships, boats, or other equipment and may be as old as the nineteenth century (NOAA 2024a). These resources were of undetermined NRHP eligibility.

Aboveground Historic Resources: Within a 3-mile radius, at least 44 aboveground inventory points are listed in the publicly available Medusa database (MHT 2024; NPS 2024). These inventory points consist of dwellings, houses of worship, landscape elements, bridges, commercial or industrial buildings (light stations, warehouses, shipyards), and municipal facilities (schools, parks). Of these resources, five are listed and 23 are eligible for listing

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

on the NRHP. Another 16 aboveground inventory points are of undetermined status for NRHP listing (MHT 2024; NPS 2024). One National Register Historic District is within the 3-mile radius, as well as seven historic districts eligible for National Register status (MHT 2024; NPS 2024).

Seven previously documented cultural resource inventory points are located within 1 mile of the TPA site (MHT 2024). Six of these resources consist of aboveground historic structures and areas associated with the Sparrow's Point Shipyard Historic District at the local level (MHT 2024; NPS 2024). These six resources are considered eligible for the NRHP (MHT 2024; NPS 2024). One additional historic resource is NRHP-listed (MHT 2024; NPS 2024).

The Sparrows Point Steel Mill was constructed by the Pennsylvania Steel Company in 1887, and was sited for the area's deep-water port access and connections to railroads such as the Baltimore and Ohio (University of Maryland, Baltimore County [UMBC] 2024). The Sparrow Point Steel Mill subsequently "became a complex constellation of factories, docks, cold and hot mills and numerous blast furnaces." After the company that would become Bethlehem Steel bought the mill, a company town called Dundalk was established in 1918 and prospered with the mill through at least the 1970s (Rudacille 2019; UMBC 2024). In 2003, Bethlehem Steel went bankrupt, and mill ownership changed until the facilities began to be dismantled and sold by circa 2012 (Rudacille 2019; UMBC 2024). Sparrow's Point was extensively redeveloped in 2017, as seen in aerial imagery for that year (Google Earth 2024). Before 2017, the area now occupied by TPA was largely open-air storage with rail lines supporting shipping. In 2017, large, covered warehouses and distribution centers were built for companies including Amazon and Home Depot. Older brick buildings were removed, including the Penwood Power House on Power House Road, at the end of the canal on Canal Road. According to the EPA (2019), site demolition was done as part of the Sparrows Point Steel Mill environmental cleanup. Extensive areas of contaminated soils and sediments were removed across Sparrow's Point as described by EPA (2019).

The LaFarge Cement facility and adjacent sheet-metal warehouses along the railroad loop off the end of Wharf Road remain at the southeast extent of the TPA site. The slag cement plant is owned by Holcim (US) Inc and rebranded under that name circa 2023, following a 2015 merger with LaFarge (Concrete Products 2015; Holcim 2023). Constructed in 1983, the Sparrows Point facility became the first to begin granulation facility in the United States to start producing a separate slag cement product (Meusel and Rose 1983; Slag Cement Association 2024).

Cultural Resources Potential: Aerial imagery and historic topographic map review indicates the presence of historic buildings and structures within 1 mile of the TPA site (Google Earth 2024; MHT 2024). These buildings and structures relate to the emergence of the Sparrow's Point Shipyard as an historic center for commercial shipping and steel manufacturing during the nineteenth through twentieth centuries (MHT 2024; NPS 2024).

Unknown terrestrial archaeological sites are of low to moderate potential in the modification scenario area and surrounding areas but could occur in more deeply buried terrestrial and shoreline deposits, or in undisturbed natural areas (intact shoreline sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Proposed TPA port modifications, through clearing, fill, or excavation, could affect the terrestrial soils across the TPA site as well as additional shoreline or submerged sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in shoreline sediments that are undisturbed by previous dredging, excavation, or erosion. Proposed TPA port modifications could affect submerged areas for wharf construction, dredging, and shoreline hardening for port development. Disturbed shoreline and channel sediments could be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile of the TPA and could be impacted physically by potential port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{10,13,24,26}	- The site is located in an existing port and industrialized area at the end of a fully developed (industrial) peninsula that extends into the Chesapeake Bay. Outside the 1-mile area occupied by the peninsula, density increases to the north/northwest (toward Baltimore) and decreases to the west (residential and parkland). Open water of the Patapsco River and Chesapeake Bay is present to the east and south. - The TPA site is fully developed (former steel mill site cleared for development). - Isolated wetlands occur within 1 mile.
Shoreline Habitats ¹⁶	- Within the modification scenario area, manmade/armored and riprap are the predominant shoreline categories. - Most other shorelines within 3 miles are also armored with riprap or bulkhead, except for some areas of natural shoreline associated with protected areas approximately 2 miles east of the TPA site.
Submerged Marine Habitats ^{12,21,22}	- Submerged Aquatic Vegetation (SAV) present 1 mile east of the modification scenario area, with additional SAV further east within 3 miles. - Benthic substrate is predominantly sand. - An oyster harvest reserve area is located approximately 3 miles to the east of the modification scenario area, however closed for harvest.
Designated Habitats / Places ^{5,6,14,15,18,19,23,27}	- Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies. - Habitat Areas of Particular Concern for Summer Flounder SAV within 3 miles. - No Important Bird Areas, Critical Habitat, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{17,25}	- Northern long-eared bat and tricolored bat: forested habitat and flyways within 3 miles. - Shortnose and Atlantic sturgeon may occur within 1 mile.
Migratory Birds and Eagles ²⁵	Bald eagles and golden eagles, along with 17 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals ^{18,20}	Harbor porpoises likely present near modification scenario area, in addition to Endangered Species Act (ESA)-protected species.
State Specific Resources ^{1,2,3,4,5,6,7,8,9,10,11,12}	- Natural Heritage Area (NHA) 127 is located adjacent to the airport. - NHA 121 is located just north of the TPA site. - Additional NHAs within 3 miles.

Sources: ¹Maryland Department of Natural Resources (MDNR) 2017a; ²MDNR 2017b; ³MDNR 2017c; ⁴MDNR 2017d; ⁵MDNR 2017e; ⁶MDNR 2017f; ⁷MDNR 2017g; ⁸MDNR 2017h; ⁹MDNR 2017i; ¹⁰MDNR 2017j; ¹¹MDNR 2019; ¹²MDNR 2023; ¹³Multi-Resolution Land Characteristics Consortium 2021; ¹⁴National Audubon Society 2024; NOAA 2021; ¹⁶NOAA 2022a; ¹⁷NOAA 2022b; ¹⁸NOAA 2023a; ¹⁹NOAA 2023b; ²⁰NOAA 2023c; ²¹The Nature Conservancy (TNC) 2010; ²²TNC 2019; ²³U.S. Fish and Wildlife Service (USFWS) 2023a; ²⁴USFWS 2023b; ²⁵USFWS 2024; ²⁶U.S. Geological Survey (USGS) 2022; ²⁷USGS 2024.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

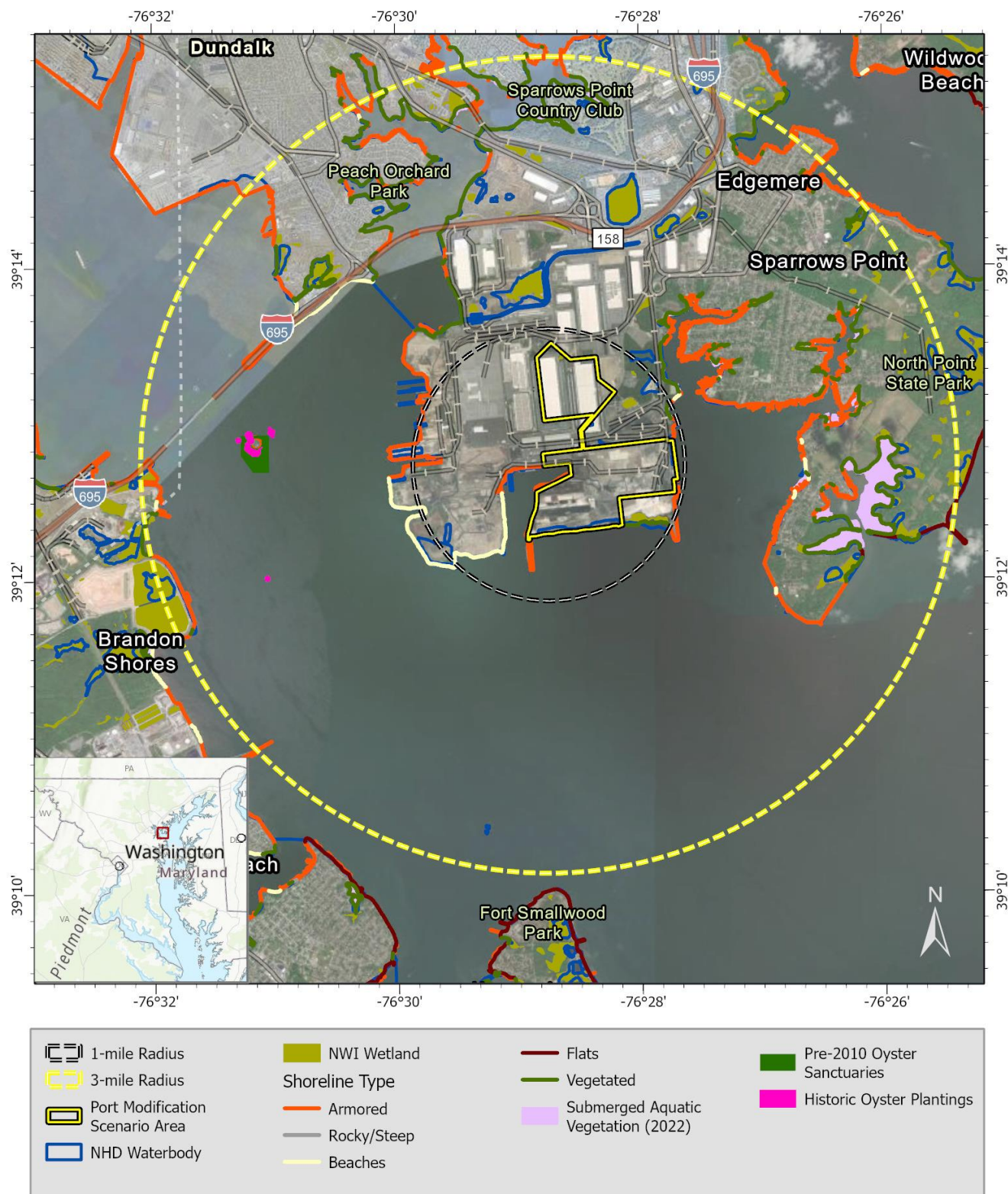


Figure 4-1. Existing habitats and natural resource areas.

Sources: MDNR 2019, 2023; NOAA 2024b; USFWS 2023b; USGS 2022. Base map: Esri World Imagery.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Sediment disturbance and temporary increase in turbidity adjacent to approximately 4100 linear feet of waterfront due to construction vessel activities.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	No terrestrial habitat within the existing modification scenario area.
Onshore Aquatic Habitats	None	No onshore aquatic habitat within the existing modification scenario area.
Shoreline	None	No significant impacts to shoreline anticipated.
Submerged Marine Habitats / Benthic Resources	Habitat alteration	Temporary disturbance of marine habitat and benthic resources adjacent to approximately 4100 linear feet of waterfront due to construction vessel activities.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	None	Sea turtles not expected to be present within 3 miles of modification scenario area.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances. However, acoustic impacts during operations would be similar to the existing land use within 1 mile.
Other Terrestrial Biota	Terrestrial noise	Impacts may occur due to construction and operations noise; however, acoustic impacts during operations would be consistent with surrounding existing land use within 1 mile.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Land use within 5 miles of the TPA site is primarily mixed commercial and residential, with industrial uses immediately adjacent to the site (Esri 2023).	None – terrestrial port modifications will be contained within site boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	BWI Airport is approximately 10 miles away. I-695 is the nearest interstate and is immediately accessible from the TPA site. Large highways within 5 miles include I-95, I-895, I-295, and MD-173. The TPA site has on-site rail access (Esri 2023).	None – terrestrial port modifications will be contained within site boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	None present within 5 miles (ArcGIS Online 2020).	None – special use areas would not be affected.	In the proposed port modification scenario, special use areas would not be affected.
Visual	The existing terminal is visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes up to 200 feet tall during construction; lights and vessel activity during operation.	Site location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible.
Noise	Noise levels are high within 5 miles of the TPA site, ranging from 45 decibels to over 90 decibels. The highest noise is along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. Operational noise dissipates within 0.5 mile, well before reaching the nearest residential areas.
Air Quality	The EPA reports 4 of 5 air quality metrics within 5 miles of the TPA site are above the 50th percentile nationally. Ozone, Nitrogen Dioxide, Diesel Particulate Matter, and Toxic Releases to Air are in the 60th, 52nd, 76th, and 67th percentile nationally, respectively. Asthma risk is in the 36th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the TPA site is in the 55th percentile nationally.	Project-related congestion.	The addition of up to 150 additional personal vehicles per day would be considered immaterial in a port facility that covers 3,300 acres and already employs thousands. The addition of up to 645 personal vehicles per day during operation may have a material impact. However, this increase is relatively minor given the area's robust road infrastructure and the already high levels of existing traffic. Limited disruption to existing traffic congestion is anticipated.

BALTIMORE

Tradepoint Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Maritime Navigation	The nearest marine highway is the Chesapeake Bay (USDOT 2018).	Increased maritime traffic.	Given the existing high levels of maritime traffic in the Chesapeake Bay, the region is well-equipped to manage and mitigate the impact of additional vessels from construction and operation activities.
Commercial Shipping	The TPA site is currently primarily occupied by commercial distribution and fulfillment centers and storage (Tradepoint Atlantic 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	Baltimore Harbor is not a top U.S. commercial fishing port (NOAA 2022c). Engagement score: low (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Project area does not overlap with commercial fishing ports/harbors. While there is commercial fishing activity in nearby ports in the Baltimore Harbor area and the increase in maritime traffic associated with the project operation could occasionally affect these activities, significant disruptions are not anticipated. Material impacts to commercially fished stocks are not anticipated.
Recreational Fishing	There are several recreational deep-sea fishing charters in and out of Baltimore Harbor. There are numerous onshore recreational fishing locations within 1 mile of the site and high recreational fishing activity in the area. Engagement score: medium (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with regions of popular recreational fishing use, and there are plentiful options for recreational fishing nearby. Although the project is close to popular areas, the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	There are parks/protected areas, including state park land, conservation easements, and local parks, within 5 miles of the modification scenario area (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may extend to nearby recreational areas, potentially affecting the natural ambiance and experience for visitors and boaters. Additionally, tall cranes associated with the project would be visible from these recreational spots, possibly impacting the scenic view.
Tourism	106,407 persons (7.3% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a). In 2023, Baltimore received over 26 million visitors (Visit Baltimore 2023).	Air and noise emissions, visual alterations, terrestrial traffic.	The addition of up to 150 workers during construction and up to 645 during operation will not materially impact tourism in an area that receives over 26 million visitors annually.
Housing and Lodging	15,072 of 74,841 vacant housing units in the MSA are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for the addition of up to 150 project workers during construction and 645 workers during operation with relatively little conflict.
Population	The population is 78,973 within 5 miles of the modification scenario area and is relatively high density. The population within the MSA is 2.8 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The addition of 150 workers during construction and up to 645 workers during operation would be immaterial to a 2.8-million-person population.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Labor Force and Employment	The civilian labor force of the MSA is 1,527,819 and employment is 1,453,881. The unemployment rate is 3.7% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 150 workers during construction and 645 workers during operation would not materially increase a labor force of over 1.5 million or impact the unemployment rate of 3.7%.
Income Levels	The per-capita income is \$48,700 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of up to 150 workers during construction and 645 during operation at prevailing wage levels would not materially alter income levels.
Community Cohesion	The county containing the modification scenario area (Baltimore County) ranks in the 2nd percentile on the national Community Cohesion Index, as reported by Chetty et al. (2022). The five adjacent counties also show below-median cohesion, with Community Cohesion Index percentiles of 1, 8, 9, 16, and 16.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Maryland was \$32.7 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports two hospitals and 23 schools are within 5 miles of the port. Just over 26% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively minor, as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- Baltimore City Department of Public Works. 2024. Surface Water in Detail. [accessed 13 August 2024]. <https://www.baltimorecity.gov/pw-bureaus/water-wastewater/surface/detail>.
- Baltimore Heritage. 2024. Archaeology in Baltimore. [accessed 14 August 2024]. <https://baltimoreheritage.org/archeology/>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Concrete Products. 2015 Holcim prepares to dispatch the bulk of its GranCem slag business. [accessed 16 August 2024]. <https://concreteproducts.com/index.php/2015/04/20/holcim-prepares-to-dispatch-the-bulk-of-its-grancem-slag-business/>.
- Dundalk Patapsco Neck Historical Society and Museum. 2017. Sparrow’s Point. [accessed 14 August 2024]. <http://www.dundalkhistory.org/sparrowspoint.html>.
- Elkinton C, Blatiak A, Ameen H. 2014. Assessment of Ports for Offshore Wind Development in the United States. Document no. 700694-USPO-R-03. U.S. Department of Energy. San Diego (CA): Garrad Hassan America, Inc. [accessed 23 September 2024]. https://www.energy.gov/sites/prod/files/2014/04/f14/wind_offshore_port_readiness.pdf.
- Energy Central. 2023 Nov 17. \$47M Announced for Tradeport Atlantic Redevelopment. [accessed August 2024]. <https://energycentral.com/news/47m-announced-tradeport-atlantic-redevelopment>.
- [EPA] U.S. Environmental Protection Agency. 2019. Public Informational Meeting on the Former Sparrows Point Steel Mill Environmental Cleanup. [accessed 16 August 2024]. https://www.epa.gov/sites/default/files/2019-10/documents/sparrowspoint_publicinfomeetingpresentation_october2019.pdf.
- [EPA] U.S. Environmental Protection Agency. 2023a. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2023b. General Conformity – De Minimis Tables. [updated 29 June 2023; accessed August 2024]. <https://www.epa.gov/general-conformity/de-minimis-tables>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Maryland Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_md.html.

BALTIMORE

Tradepoint Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

[EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.

Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.

Fox News Baltimore. 2023 Apr 21. Governor Moore Attends Offshore Wind Announcement at Tradepoint Atlantic. [accessed August 2024]. <https://foxbaltimore.com/news/local/governor-moore-attends-offshore-wind-announcement-at-tradepoint-atlantic>.

Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.

Google Maps. 2024. 39°12'44.06"N, 76°28'45.06"W. Street View. [accessed 9 May 2024].

Holcim US. 2023. Holcim US Unites Legacy Brands in Mid-Atlantic Region. [accessed 16 August 2024]. <https://www.holcim.us/holcim-unites-legacy-brands-in-mid-atlantic-region>.

The Lost Towns Project. 2024. Native American Archaeology in Anne Arundel County, Maryland: A Heritage Toolbox. [accessed 14 July 2024]. <https://storymaps.arcgis.com/stories/cc7022c6a26c4c9f8664ca809cfaadc>.

Maryland Historical Trust. 2024. Medusa Cultural Resources Information System. [accessed 14 August 2024]. <https://apps.mht.maryland.gov/Medusa/MedusaMap.html>.

[MDNR] Maryland Department of Natural Resources. 2017a. Maryland Finfish - Herring Juvenile Habitat. [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-herring-juvenile-habitat/about>.

[MDNR] Maryland Department of Natural Resources. 2017b. Maryland Finfish - Tidal (Adult Habitat). [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-tidal-adult-habitat/about>.

[MDNR] Maryland Department of Natural Resources. 2017c. Maryland Finfish - White Perch Juvenile Habitat. [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-white-perch-juvenile-habitat/about>.

[MDNR] Maryland Department of Natural Resources. 2017d. Maryland Finfish - Yellow Perch Spawning Habitat. [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-finish-yellow-perch-spawning-habitat/about>.

[MDNR] Maryland Department of Natural Resources. 2017e. Maryland Focal Areas - Targeted Ecological Areas. [accessed 7 August 2024]. https://data.imap.maryland.gov/datasets/a56174cc59914d44812184ee925b9e51_1/explore?location=39.240836%2C-76.483489%2C11.86.

[MDNR] Maryland Department of Natural Resources. 2017f. Maryland Living Resources - Natural Heritage Areas. [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-living-resources-natural-heritage-areas/about>.

[MDNR] Maryland Department of Natural Resources. 2017g. Maryland Living Resources - Sensitive Species Project Review Areas. [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-living-resources-sensitive-species-project-review-areas/about>.

[MDNR] Maryland Department of Natural Resources. 2017h. Maryland Shellfish - Oyster Harvest Reserves. [accessed 7 August 2024]. https://data.imap.maryland.gov/datasets/707df439c0af42fab213e3633f42f722_0/explore?location=39.204753%2C-76.494046%2C13.96.

BALTIMORE

Tradeport Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

[MDNR] Maryland Department of Natural Resources. 2017i. Maryland Shellfish - Public Shellfishery Areas. [accessed 7 August 2024]. https://data.imap.maryland.gov/datasets/241ab949191f4ef88e40663d21dbb612_3/explore?location=39.160138%2C-76.384880%2C11.94.

[MDNR] Maryland Department of Natural Resources. 2017j. Maryland Wetlands - Wetlands, Polygon (Special State Concern). [accessed 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-wetlands-wetlands-polygon-special-state-concern/about>.

[MDNR] Maryland Department of Natural Resources. 2019. Maryland Shellfish - Oyster Sanctuaries. [accessed 7 August 2024]. https://data.imap.maryland.gov/datasets/746edac445f345c5abb1ca307c5ddd4f_4/explore?location=39.100880%2C-76.325271%2C10.61.

[MDNR] Maryland Department of Natural Resources. 2023. Maryland Submerged Aquatic Vegetation 2021. [access 7 August 2024]. <https://data.imap.maryland.gov/datasets/maryland::maryland-submerged-aquatic-vegetation-2021/about>.

Meusel JW and Rose JH. 1983. Production of Granulated Blast Furnace Slag at Sparrows Point, and the Workability and Strength Potential of Concrete Incorporating the Slag. [accessed 16 August 2024]. <https://www.concrete.org/publications/internationalconcreteabstractsportal/m/details/id/6730>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2018. NOAA Chart 12281. 57th ed. Last correction 12 February 2024.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. Chesapeake Bay and the Outer Coasts of Maryland and Virginia, 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/53950>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022c. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. <https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:>.

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

BALTIMORE

Tradepoint Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Ports America. 2024. Baltimore, MD – Tradepoint Atlantic Terminal. [accessed August 2024]. <https://www.portsamerica.com/our-locations/baltimore-md?terminal=trade-point-atlantic-terminal>.

Rudacille D. 2019. In Baltimore, Visions of Life After Steel. Bloomberg, May 15. [accessed 16 August 2024]. <https://www.bloomberg.com/news/articles/2019-05-15/photos-what-bethlehem-steel-meant-to-baltimore>.

Sierra Club. 2024 Jun 14. Turbulence Rattles the Northeast's Nascent Offshore Wind Industry. June 14, 2024. [accessed August 2024]. <https://www.sierraclub.org/sierra/2024-2-summer/feature/turbulence-rattles-northeast-s-nascent-offshore-wind-industry/>.

Slag Cement Association. 2024. Why Slag Cement? [accessed 16 August 2024]. <https://www.slacement.org/why-slag-cement>.

S&P Global. 2024. Ports & Terminals Guide. [accessed 30 April 2024]. S&P Global Maritime Portal.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston: Eastern Resource Office of The Nature Conservancy. [accessed 4 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 4 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

Tradepoint Atlantic. 2018a. Tradepoint Atlantic On Site Water Treatment Factsheet. [accessed September 2024]. https://www.tradepointatlantic.com/wp-content/uploads/2018/04/Factsheet_Tradepoint_Water_Treatment.pdf.

Tradepoint Atlantic. 2018b. Offshore Wind Fact Sheet. [accessed August 2024]. https://www.tradepointatlantic.com/wp-content/uploads/2018/04/Factsheet_Tradepoint_Offshore_Wind.pdf.

BALTIMORE

Tradepoint Atlantic in Baltimore, Maryland – 39°12'44.06"N, 76°28'45.06"W

Tradepoint Atlantic. 2020. Tradepoint Marine. [accessed August 2024]. <https://www.tradepointatlantic.com/wp-content/uploads/2020/06/TPA-Marine-v4.pdf>.

Tradepoint Atlantic. 2021. Offshore Wind Fact Sheet. [accessed August 2024]. <https://www.tradepointatlantic.com/wp-content/uploads/2021/08/Offshore-Wind-2021v2.pdf>.

Tradepoint Atlantic. 2024. Why Tradepoint. [accessed August 2024]. <https://www.tradepointatlantic.com/why-tradepoint/>.

[UMBC] University of Maryland, Baltimore County. 2024. Mille Stories: Sparrows Point. [accessed 16 August 2024]. <https://millstories.umbc.edu/sparrows-point/>.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for Connecticut. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed 7 June 2024]. <https://fred.stlouisfed.org/series/QTAXTOTALQTAXCAT3MDNO#0>

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

US Wind Inc. 2024. Sparrows Point Steel. [accessed August 2024]. <https://uswindinc.com/sps/>.

Visit Baltimore. 2023. Annual report FY2023. [accessed August 2024]. <https://viewer.joomag.com/visit-baltimore-annual-report-fy2023-2023/0972924001699995590?short>.

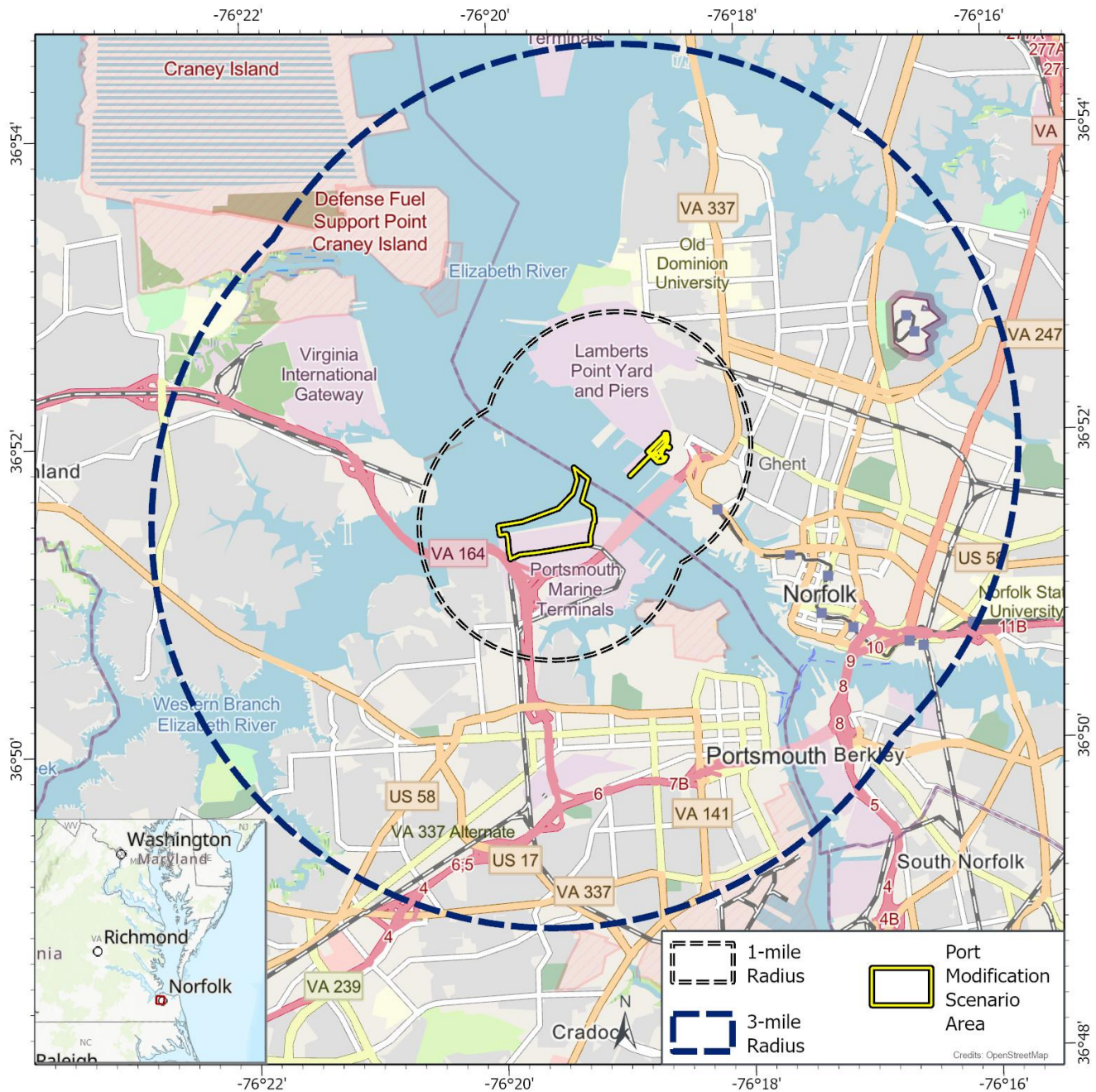
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

HAMPTON ROADS PORT PROFILE

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W
Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Bureau of Ocean Energy Management

December 18, 2024



HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

1 Port Overview

1.1 Portsmouth, Virginia (Portsmouth Marine Terminal)

Owner:	Virginia Port Authority (Virginia Port Authority 2023a)
Operator:	Dominion Energy (Virginia Port Authority 2023b)
Primary Existing Uses:	Commercial shipping and cargo, wind energy (BVG Associates 2018)
Primary Existing Cargo:	Containers, Ro/Ro, breakbulk and bulk commodities (BVG Associates 2018)
Existing Port Employment:	Approximately 565,000 direct and indirect jobs (Virginia Port Authority 2023a)
Typical Operating Hours:	6:00 a.m. to 6 p.m. weekdays, 7 a.m. to 11 a.m. Saturdays (S&P Global 2024)
Terminal Land Area:	287 acres (Virginia Port Authority 2023b)
Closest Wind Energy Lease Area:	Coastal Virginia Offshore Wind (OCS-A 0483)
Distance to Closest Lease Area:	Approximately 58 nautical miles
Potential Offshore Wind Port Uses:	Marshalling and manufacturing (BVG Associates 2018)

Portsmouth Marine Terminal (PMT) in Portsmouth, Virginia, is a 287-acre multi-use terminal on the west bank of the Elizabeth River. Described in detail in Section 8.2 of the BVG Associates report *The Virginia Advantage* (BVG Associates 2018), PMT primarily manages cargo, including break bulk, containers, and roll-on/roll-off (Ro/Ro) cargo operations. The terminal has three berths along a 4,500-foot wharf that can accommodate multiple vessels at once. Water depths along the main quayside vary from 38 to 40 feet. PMT has an existing 44-acre lay down area for empty containers as well as a 45-acre vacant parcel that is being developed for offshore wind use (BVG Associates 2018).

PMT does not have direct on-dock rail service; however, the property shares a boundary with adjacent rail service and has access to local highways. The existing ground bearing capacity of the upland staging area is estimated at 1,000 to 3,000 pounds per square foot (psf) (BVG Associates 2018).

In August 2022, a developer, Skanska, was selected by the Virginia Port Authority to redevelop 72 acres of the PMT site for offshore wind use (Skanska 2022), and the U.S. Department of Transportation (USDOT) provided a \$20 million grant to the Port of Virginia in December 2021 to prepare the port for offshore wind use (Buljan 2022). Once construction is completed in 2025, Dominion Energy will use PMT for staging and pre-assembly for their Coastal Virginia Offshore Wind (CVOW) project (Buljan 2022). This project includes the construction of 176 offshore wind turbines located approximately 27 miles east of Virginia Beach (Virginia Port Authority 2023).

An 80-acre parcel adjacent to PMT was planned for development to support the CVOW by Siemens Gamesa as a wind-turbine blade manufacturing facility; however, in 2023 Siemens Gamesa announced it was discontinuing its plans for buildout based on current economic conditions and forecasts (Sidersky 2023). The project discontinuation is not expected to impact the CVOW project or other wind energy projects associated with PMT.

Existing capabilities are summarized in Table 1-1.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	750 (National Oceanic and Atmospheric Administration [NOAA] 2012)
	Port Access Channel Controlling Depth (feet)	40 (NOAA 2012)
	Overhead / Air Draft Restriction (feet)	Unlimited
	Number of Berths	3 (Skanska 2022)
Quayside	Bearing Capacity (psf)	Estimated 1,000–3,000
	Length (feet)	3,540 (Skanska 2022)
	Depth (feet)	38
	Suitable for Spud-Jacking (Yes/No)	Yes (U.S. Army Corps of Engineers [USACE] 2023)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	22 (Skanska 2022)
	Upland Storage/Staging Area Bearing Capacity (metric tons [mt]/square meters [m ²])	Estimated 4.9–14.6
	Haul Route Area Bearing Capacity (mt/m ²)	Estimated 4.9–14.6
	Approx. Size of Covered Storage Area (acres)	None
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	Yes
	Width of Ro/Ro Berth (feet)	300
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	Estimated 4.9–14.6
Cranes	Lifting Capacity (mt)	500–700 mt (estimated) (Maxim Cranes 2023)
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	Shares east boundary with rail lines
	On-Site Highway (Yes/No)	No

Source: BVG Associates 2018, unless otherwise noted.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The proposed conceptual design for PMT is presented in *The Virginia Advantage: The roadmap for the offshore wind supply chain in Virginia* (BVG Associates 2018) and is also described in a press release by Skanska, the site developer (Skanska 2022). The proposed development of the site includes improvements to 1,500 feet of the existing 3,540-foot wharf and to three heavy-lift berths (including a Ro/Ro berth); dredging of a channel and two turning basins (USACE 2023); upland ground improvement to increase bearing capacity; and the installation of high mast lighting, stormwater management systems, and security upgrades (Skanska 2022).

Modifications required to provide sufficient access to PMT include the dredging of two new turning basins and an access channel to varying depths between 38 and 57 feet (referenced to mean lower low water) (USACE 2023). Dredging is planned to be conducted via mechanical dredging, with an estimated total dredge volume of approximately 217,000 cubic yards, which is proposed for disposal at the Norfolk Ocean Disposal Site in the Atlantic Ocean (USACE 2023). Due to the planned disposal of the dredged material at the offshore dump site, no dewatering or stabilization of the dredged material is expected.

Within the dredge footprint, an estimated 1,315 × 121-foot area would be prepared for use as jack-up vessel pad adjacent to two of the three berths. Modifications required to construct the jack-up pad include over-dredging by 10 additional feet within the approximately 3.7-acre footprint and backfilling with gravel to form a dense stone mat.

Modifications required to improve the existing berths, which are a combined 1,500 linear feet, include steel pile driving and the construction of steel rebar-reinforced concrete deck pads. It is expected that large crawler cranes would be used on the quays for component transfer to and from vessels as well as the use of the Ro/Ro berth (BVG Associates 2018).

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Modifications required to prepare the upland portion of the site, which will be used for component storage and assembly, include the clearing and grading of the existing site and ground improvements, assumed to include the placement of a thick layer of dense graded aggregate (DGA) which would be placed and compacted to increase the ground bearing capacity to allow for the use of self-propelled modular transporters to move components around the site (BVG Associates 2018). Above the DGA layer, the upland area would be paved (Buljan 2022).

The concept document also notes the potential for the construction of production and administrative buildings and improvements to lighting, security fencing and gates, electrical, and stormwater services (BVG Associates 2018). Additional bulkhead improvements, including the placement of riprap to improve stability, may occur in future development stages. The Port of Virginia is investing over \$220 million to develop PMT. Skanska began work in 2021 and is expected to complete the upgrades in 2025 (Buljan 2022).

As noted, PMT has no air draft restrictions on-site or between the site and the open ocean.

Potential impacts during operation are likely minimal, as offshore wind activities are expected to replace some of the port's current commercial cargo operations. Port calls, terrestrial cargo transportation, and worker activity are not expected to increase substantially as result of the change in primary port operations to offshore wind-related activities.

1.2 Norfolk, Virginia (Fairwinds Landing at Lambert's Point Docks)

Owner:	Norfolk Southern Railway Company (Sidersky 2023)
Operator:	CP&O (a joint partnership between The Cooper Group, Ports America, and SSA Marine) (CP&O 2024)
Primary Existing Uses:	Commercial cargo (Thalhimer 2022)
Primary Existing Cargo:	Breakbulk, Ro/Ro, forest products, crude rubber, and project cargo (Norfolk Southern 2024)
Existing Port Employment:	Approximately 565,000 direct and indirect jobs (Virginia Port Authority 2023)
Typical Operating Hours:	24 hours per day, 7 days per week (Norfolk Southern 2024)
Terminal Land Area:	111+ acres (Hampton Roads Alliance 2023)
Closest Wind Energy Lease Area:	Coastal Virginia Offshore Wind (OCS-A 0483)
Distance to Closest Lease Area:	Approximately 58 nautical miles
Potential Offshore Wind Port Uses:	Operations and Maintenance, Storage (Hampton Roads Alliance 2023)

The Fairwinds Landing, LLC, offshore wind Monitoring and Coordination Center (MCC) is under development at the existing Lambert's Point Docks (LPD) site in Norfolk, Virginia. LPD is a commercial and industrial cargo port, covering over 111 acres, and is located on the eastern bank of the Elizabeth River in Norfolk harbor. LPD primarily manages commercial and industrial cargo, including rubber, wood products, machinery, and breakbulk (Norfolk Southern 2024). The terminal has two finger piers with minimum berthing depths of 32 feet, six existing berths, and a natural channel with a depth of approximately 45 feet (Norfolk Southern 2024). There is approximately 6,000 linear feet of berthing space and 1.2 million square feet of covered warehouse and outdoor storage space (Norfolk Southern 2024).

LPD has on-site and on-dock rail service, two existing gantry cranes, and a Ro/Ro berth (Norfolk Southern 2024). Existing highway connections are approximately 2 miles from the terminal. The terminal has no air draft restrictions on-site or between the terminal and the ocean.

In 2022, Hampton Roads-based company Fairwinds Landing, LLC, agreed to a 30-year lease with Norfolk Southern Railway Company to develop the LPD site to support offshore wind (Miller Group 2022). In 2023, construction began on a 7.5-acre portion of the site for an operations and maintenance (O&M) facility known as the MCC (Miller

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Group 2023). The MCC operations center will be used by Dominion Energy Inc. as its homeport for O&M activities for the CVOW project (Sidersky 2023). The construction of the MCC represents Phase 1 of a \$100 million (Miller Group 2022) multi-phase redevelopment to transform the former LPD into a marine logistics center (Hampton Roads Alliance 2023).

Existing capabilities are summarized in Table 1-2.

Table 1-2. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	750 (NOAA 2012)
	Port Access Channel Controlling Depth (feet)	40 (NOAA 2012)
	Overhead / Air Draft Restriction (feet)	Unlimited
	Number of Berths	6
Quayside	Bearing Capacity (psf)	Not provided by Norfolk Southern
	Length (feet)	6,000+ (Ports America 2023)
	Depth (feet)	32–40
	Suitable for Spud-Jacking (Yes/No)	Unknown (site not assessed) (Elkinton et al. 2014)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	111+ (Hampton Roads Alliance 2023)
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	Not provided by Norfolk Southern
	Haul Route Area Bearing Capacity (mt/m ²)	Not provided by Norfolk Southern
	Approx. Size of Covered Storage Area (acres)	27.6
Ro/Ro	Ro/Ro Capability (Yes/No)	Yes (CP&O 2024)
	Width of Ro/Ro Berth (feet)	25 (Estimated from Google Earth Pro imagery 2024)
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	Not provided by Norfolk Southern
Cranes	Lifting Capacity (mt)	Up to 50 (Thalhimer 2022)
	Height Restrictions (Yes/No)	No
Transportation	On-Site Rail (Yes/No)	Yes
	On-Site Highway (Yes/No)	No

Source: Norfolk Southern 2024, unless otherwise indicated.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The proposed conceptual design for the Fairwinds Landing MCC is described in the Miller Group press release dated June 29, 2023 (Miller Group 2023) and in further detail in the Virginia Business news article “Fairwinds Landing project breaks ground in Norfolk,” dated June 29, 2023 (Sidersky 2023). In 2023, Fairwinds Landing received \$39 million in federal funding from the City of Norfolk Economic Development Authority, via the USDOT. The funding will support the planned \$100 million multi-phase development of LPD into a marine logistics center (Hampton Roads Alliance 2023).

The first phase of planned development includes the construction of the MCC, which involves developing 7.5 acres of the 111+ acre LPD site. The MCC will include a 31,167-square-foot O&M logistics center, a 17,280-square-foot covered warehouse to store parts and components, and modifications to 950 linear feet of existing wharf frontage to support a Service Operation Vessel (SOV) and two Crew Transfer Vessels (CTVs) (Sidersky 2023).

CTVs are described as requiring up to 630 feet of wharf frontage with an available draft of up to 39 feet (New York State Energy Research and Development Authority [NYSERDA] 2019). CTVs can transport tools, small components (cargo payloads up to 5 tons), and up to 12 crew members (NYSERDA 2019). SOVs are described as vessels that “loiter and operate as in-field accommodations” for workers servicing wind farms (Moffat & Nichol 2023). SOVs are up to 400 feet in length and require available drafts up to 25 feet (Moffat & Nichol 2023).

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Additional requirements for a port to house SOVs are access to quayside cranes and/or forklifts, quayside ground bearing capacity over 4,600 psf, office space, and links to local transport (Moffat & Nichol 2023).

Modifications required to meet these requirements include providing a small mobile crane, increasing the quayside bearing capacity to up to 4,600 psf, and modifications to existing routes from the wharf to the storage warehouse. Specific modifications required to increase quayside bearing capacity potentially include driving new steel piles to support the wharf deck, placement of fill that would then be compacted using vibratory rollers, or placement of surcharge loads. Prior to these modifications, existing on-dock rail and structures would be removed along the proposed 950 linear feet of wharf frontage (Miller Group 2023).

Modifications required to construct the approximately 0.4-acre covered warehouse would include the demolition of existing buildings, structures and existing rail lines within and adjacent to the proposed building footprint. Following demolition and clearing, the site would be graded and compacted to increase the ground bearing capacity (to levels as high as 4,600 psf per Moffat & Nichol 2023), and a concrete pad would be constructed for the warehouse structure.

Modifications required to construct the approximately 0.7-acre MCC would be similar to those required for the warehouse, with the exception of the requirement to improve the existing ground bearing capacity. Existing buildings and rail lines would be demolished, the site would be cleared and graded, and the MCC would be constructed using standard means and methods. Images of the conceptual design of the MCC depict additional landscape improvements (e.g., grassy areas, vegetation, trees, and walking paths) that would also be installed to enhance the visual aspect of the site (Sidersky 2023).

Modifications required to improve existing roads and accessways would be similar to those described above for the warehouse and MCC. Existing building, structures, and rail lines would be demolished followed by site clearing, grading and soil compaction to improve the ground bearing capacity for component transfer from the warehouse to the wharf, followed by paving.

Additional minor modifications expected for site development include the construction of parking lots, security features (fencing and gates), lighting, and any required modifications to the existing stormwater collection and management systems. The Miller Group, which is leading the redevelopment efforts, began construction in the fall of 2023, and the site is expected to be complete and operational in 2025 (Sidersky 2023).

As noted, the LPD site has no air draft restrictions on-site or between the site and the open ocean.

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (e.g., CTVs and SOVs are expected to make port calls every 10 to 30 days), an increase in local terrestrial cargo transportation (e.g., transport and storage of components to the warehouse), and associated worker activities (e.g., use of the MCC to support OSW activities and logistics planning).

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Portsmouth and Norfolk Counties, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Portsmouth and Norfolk Counties, Virginia, include urban areas with a moderate to high population density and a significant industrial base. Emission sources within the boundaries of Portsmouth and Norfolk Counties, within the region, and within neighboring metropolitan areas affect the county's air quality. The Portsmouth County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, solvent use in industry, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Table 2-1. Emissions Inventory in Tons per Year for Portsmouth County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	32	6	–	–	–
Biogenics*	164	33	–	–	–	1,502	132	–
Dust	–	–	–	155	25	–	–	–
Fires	–	–	–	–	–	–	–	–
Fuel Combustion	384	159	7	124	111	46	15	–
Industrial Processes[§]	–	–	–	–	–	30	–	–
Miscellaneous[†]	79	8	7	56	51	1,169	199	–
Mobile	5,906	2,505	65	89	60	487	125	464,697
Point-Sources	407	1,083	153	26	25	42	52	491,782
Total	6,940	3,788	232	482	278	3,276	523	956,479

Source: EPA (2023).

Note: CO = carbon monoxide; CO₂e = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

[§] Industrial processes includes various Storage and Transfer facilities.

[†] Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The Norfolk County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-2. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles. Volatile organic compounds (VOC) emissions are primarily from solvent use in industry and highway vehicles (EPA 2023).

Table 2-2. Emissions Inventory in Tons per Year for Norfolk County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Agriculture	–	–	–	31	6	–	–	–
Biogenics*	73	13	–	–	–	638	58	–
Dust	–	–	–	795	100	–	–	–
Fires	–	–	–	–	–	–	–	–
Fuel Combustion	881	469	26	377	330	84	23	–
Industrial Processes[§]	–	–	–	–	–	100	4	–
Miscellaneous[†]	209	20	16	203	187	2,637	494	–
Mobile	15,746	3,176	58	190	114	1,009	283	1,122,054
Point-Sources	1,032	599	51	103	76	427	81	73,908
Total	17,941	4,277	151	1,699	813	4,895	943	1,195,962

Source: EPA (2023).

Note: MTpy = metric tons per year; the metric unit is used for CO₂e emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

[§] Industrial processes includes various Storage and Transfer facilities.

[†] Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Portsmouth and Norfolk Counties meet the National Ambient Air Quality Standards (NAAQS) and are in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Portsmouth and Norfolk Counties are in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Portsmouth and Norfolk Counties reported an O₃ design value of 56.0 parts per billion (ppb) on average for the 2019 to 2021 period, 55.0 ppb on average for the 2020 to 2022 period, and 57.3 ppb on average for the 2021 to 2023 period (EPA 2024b).

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

2.1 Modification-Related Emissions for Portsmouth County

Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates for Portsmouth County (Table 2-3) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 3 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Construction Emission Totals for Portsmouth County

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	26.24	50.26	0.10	2.04	1.29	1.25	–	10,438.38
Nonroad Emissions	7.07	19.14	0.03	1.34	1.13	1.10	0.65	8,434.26
On-Road Emissions	7.97	0.58	<0.01	0.10	1.19	0.29	0.03	819.70
Fugitive Dust	–	–	–	–	51.64	5.16	–	–
Total	41.28	69.98	0.13	3.48	55.25	7.8	0.68	19,692.34

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from dredging expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-4) were calculated for Portsmouth County based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Table 2-4. Estimated Operational Emission Totals for Portsmouth County

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.19	0.01	<0.01	<0.01	0.03	0.01	<0.01	19.71
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.18
Total	0.79	0.63	<0.01	0.02	0.04	0.02	<0.01	264.28

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues for Portsmouth County: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the new berth construction phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 71.5 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

2.2 Modification-Related Emissions for Norfolk County

Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. The emissions would come from land-based mobile sources during port modification activities, as no marine activities occur during the construction phase. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates for Norfolk County (Table 2-5) were calculated in tpy based on anticipated hours of operation, total days of operation, HP rating, assumed load factor, fuel type, and the following standard assumptions:

- Construction would occur over 2 years.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-5. Estimated Construction Emission Totals for Norfolk County

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	–	–	–	–	–	–	–	–
Nonroad Emissions	8.49	23.63	0.03	1.59	1.37	1.32	0.77	10,255.11
On-Road Emissions	11.52	0.84	0.01	0.15	1.72	0.42	0.04	1,184.63
Fugitive Dust	–	–	–	–	1.80	0.18	–	–
Total	20.01	24.47	0.04	1.74	4.89	1.92	0.81	11,439.74

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from construction could have some impact during the construction phase. However, the emissions would be temporary and only occur over the construction period, so they are not expected to affect the overall air

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

quality status of the county significantly. Nonetheless, site-specific air quality analyses and monitoring, based on the final designs and construction plans, may be needed to assess any localized impacts during this phase.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-6) were calculated for Norfolk County based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-6. Estimated Operational Emission Totals for Norfolk County

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	55.08
On-Road Emissions	0.32	0.03	<0.01	<0.01	0.05	0.01	<0.01	33.23
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.30
Total	0.92	0.65	<0.01	0.02	0.06	0.02	<0.01	278.06

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTPy = metric tons per year.

Area of Potential Air Quality Issues for Norfolk County: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the storage area size expansion phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 79.1 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in both regions because of emissions from dredging during construction and other construction activities; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W
Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or O&M. These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The modification scenario areas for the Portsmouth Marine Terminal (PMT) in Portsmouth, Virginia, and the Lambert's Point Docks (LPD), in Norfolk, Virginia, fall within Portsmouth and Norfolk Counties, Virginia, along the east and west shorelines of the Elizabeth River, and are surrounded by myriad historic resources (National Park Service [NPS] 2024; Virginia Department of Historic Resources [VDHR] 2024). Review of the confidential VDHR Virginia Cultural Resource Information System (VCRIS) database and publicly available reference sources identified more than 1,000 previously documented cultural resource inventory points within the combined areas of a 3-mile radius surrounding each modification scenario area (3-mile study area) consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects (NPS 2024; VDHR 2024). These inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal levels (NPS 2024; VDHR 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The PMT modification scenario area is a 287-acre site on the waterfront in the Hampton Roads area of southern Virginia that was previously occupied by a container terminal, railway service hub, and warehousing facility. During the late seventeenth and through the eighteenth centuries, the Hampton Roads region was a major shipping hub for trans-Atlantic trade. The PMT modification scenario area, historically known as Pinner's Point, became a steamship port in the nineteenth century and was most recently redeveloped, starting in 1971, under the ownership of the Virginia Port Authority (Google Earth 2024; Virginia Places 2024). Based on recent aerial photographs, the area containing PMT encompasses a concrete platform on the main channel of the Elizabeth River with multiple wharves and berths. Two buildings are within the modification scenario area, appearing to be industrial buildings (Google Earth 2024). Although BVG reported approximately 10 buildings at PMT circa 2018 totaling more than 65,000 square feet of space, including brick, multistory office buildings and machine shops, storage, and warehouse buildings, these buildings are primarily south of the modification scenario area (BVG Associates 2018; Google Earth 2024; Transportation and Logistics International 2014; U.S. Geological Survey [USGS] 2016).

Across the Elizabeth River channel, to the northeast of the PMT modification scenario area, LPD is a 111-acre parcel that was once part of a Norfolk Southern railway coal terminal. Originally named for the seventeenth-century property owner, Thomas Lambert, the site became a railway center in the mid-nineteenth century and was notable as a transport center for coal. It later developed into a major coal pier as part of the Norfolk and Western Railway system in the late nineteenth century and was part the Pier 6 transloading facility for coal and other goods under Norfolk Southern in the 1980s (Norfolk Southern 2024).

The PMT modification scenario area is east of the Port Norfolk Historic District and a residential and commercial neighborhood, with limited visual screening offered by roadways, other structures, fence lines, or vegetation. Route

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W
Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

164 is on the west and southwest sides of the PMT modification scenario area, and Martin Luther King Freeway runs along the south and southeast sides (Google Earth 2024). The LPD facility opens on to the Elizabeth River on the west and south sides and is surrounded to the north and east by a railway yard, a railroad turntable and associated building, a two-story office building, warehouse buildings, storage tanks, coal loading facilities and other structures with limited vegetation screening. The brick office building and roundtable building in the railyards appear from aerial imagery to be late nineteenth to early twentieth century in style and age. None of the other buildings in the LPD are likely to be important historically. Buildings and facilities bordering the LPD to the north, including a water treatment plant, a sports center and fields, Whitehurst Hall, and the Powhatan Apartments, appear to be non-historic based on their construction elements as apparent in aerial imagery (Google Earth 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Native American Pre-Contact, Contact, and Post-Contact period and Historic period archaeological sites, are known to occur within the 3-mile study area, with 78 sites identified in the confidential VCRIS database (VDHR 2024). These archaeological resources include Pre-Contact villages, camp sites, burials, and lithic scatters, and Post-Contact house foundations, trash dumps, cemeteries, and at least one unnamed shipwreck (NPS 2024; VDHR 2024).

Within the combined areas of a 1-mile radius surrounding each modification scenario area (1-mile study area), there are two archaeological sites, a Pre-Contact campsite and a multicomponent Pre-Contact through twentieth-century resource (VDHR 2024). Older soils may persist undisturbed by previous port, railway, or building construction and existing harbor developments.

Marine Archaeological Resources: Within the 3-mile study area, there is one unnamed shipwreck and approximately 14 submerged obstructions, all of unknown age and undetermined NRHP eligibility (NOAA 2024a).

Aboveground Historic Resources: Within the 3-mile study area, there are more than 1,000 aboveground inventory points listed in the confidential VCRIS database (NPS 2024; VDHR 2024). These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, water tanks, sheds), and municipal facilities. Of these resources, 53 are listed on the NRHP and 27 are eligible or potentially eligible (NPS 2024; VDHR 2024). There are 41 National Register districts within the 3-mile study area and two National Historic Landmarks, Drydock Number One at the Norfolk Naval Shipyard and Lightship No. 101, also known as the Portsmouth Lightship, a nineteenth-century lightship vessel (NPS 2024; VDHR 2024).

There are 101 previously documented cultural resource inventory points located within the 1-mile study area (VDHR 2024). These resources consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists (NPS 2024; VDHR 2024). Of these, none are listed or are considered eligible for the NRHP (NPS 2024; VDHR 2024). There are six National Register Historic Districts located within or overlapping the 1-mile study area, collectively encompassing 401 contributing historic resource elements (NPS 2024; VDHR 2024).

Cultural Resources Potential: Aerial imagery and historic topographic map review of the 1-mile study area indicates the presence of a low number of cultural resources and historic structures (Google Earth 2024; VDHR 2024). Many of these historic areas, buildings, and structures are at the margins of the 1-mile study area but relate to the emergence of the Hampton Roads area as a historic center for shipping, transportation, and industry during the eighteenth and nineteenth centuries (NPS 2024; VDHR 2024). The brick office building and brick roundtable building and structure, associated with the railyards at the LPD, appear from aerial imagery to be late nineteenth to early twentieth century in style and age. Public VCRIS documentation identifies several buildings, such as office buildings, warehouses, sheds, and foundations, as being constructed during three historic periods including 1917, 1930, and 1968 (VDHR 2024). The LPD fully overlaps with a state-level historic district of the same name that encompasses 82 state-level inventoried resources, which are considered contributing and noncontributing structures to the district. These resources, as grouped in the state-level historic district, were determined to be to be eligible as a National Historic District (VDHR 2024).

Unknown terrestrial archaeological sites are of low to moderate potential in the modification scenario areas or surrounding areas and could occur adjacent in more deeply buried terrestrial and riverbank deposits, or in undisturbed natural areas (intact riverbank sediments). Post-Contact sites could occur at historical areas that have

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

experienced redevelopment through time. Proposed modifications at PMT are likely to affect shoreline or riverbed sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the existing port represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks and obstructions were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in riverbed sediments that are undisturbed by previous dredging, excavation, or erosion. Port modifications could affect riverbank and channel sediments, which could be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the port. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,12,14}	• Located on the Elizabeth River in existing ports and industrialized areas. • High- and mid-density developed areas (industrialized and residential) within 1 mile. • Isolated wetlands within 3 miles, north of the modification scenario areas, on opposite shores of the river.
Shoreline Habitats ⁸	• Within the modification scenario areas, manmade/ armored is the predominant shoreline category. • Within 3 miles, manmade/armored and riprap is the predominant shoreline category.
Submerged Marine Habitats ^{9,10}	• No Submerged Aquatic Vegetation identified within 3 miles of modification scenario areas. • Benthic substrate is primarily sand.
Designated Habitats / Places ^{2,3,5,6,7,11,15}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Atlantic Herring, Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies. • No Important Bird Areas, Critical Habitat, or Biologically Important Areas (marine mammals) identified within 3 miles.
ESA Listed Species ^{4,6,13}	• Tricolored bat: flyways within 1 mile. • Eastern black rail may occur within 3 miles. • Piping plover may occur within 3 miles. • Shortnose and Atlantic sturgeon may occur within 1 mile. • Green, Kemp's ridley, leatherback, and loggerhead sea turtles may occur within 1 mile.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Resource Category	Existing Conditions
Migratory Birds and Eagles¹³	• Bald eagles, along with 115 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals^{5,7}	• Harbor porpoises and Atlantic bottlenose dolphins likely present near port.
State Specific Resources¹⁶	• Coastal Avian Protection Zone established.

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021; ²National Audubon Society 2024; NOAA 2021; ⁴NOAA 2022a; ⁵NOAA 2023a; ⁶NOAA 2023b; ⁷NOAA 2023c; ⁸NOAA 2023d; ⁹The Nature Conservancy (TNC) 2010; ¹⁰TNC 2019; ¹¹U.S. Fish and Wildlife Service (USFWS) 2023a; ¹²USFWS 2023b; ¹³USFWS 2024; ¹⁴USGS 2022; ¹⁵USGS 2024; ¹⁶Virginia Department of Environmental Management 2020.

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition	Approximately 60 acres of sediment disturbance and temporary increase in turbidity due to dredging for Portsmouth only. No anticipated water quality impacts for Norfolk.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	None	No terrestrial habitats within either modification scenario area.
Onshore Aquatic Habitats	None	No onshore aquatic habitats within either modification scenario area.
Shoreline	None	No change in shoreline type is anticipated within either modification scenario area.
Submerged Marine Habitats / Benthic Resources	Habitat alteration	Permanent loss of approximately 4 acres of benthic habitat and resources due to quayside seabed bearing capacity improvement (jack up-pad) placement; however soft sandy benthic habitat is ubiquitous throughout the area.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Endangered Species Act (ESA)–listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, may use habitat and flyways within 1 mile and are at risk from temporary acoustic disturbances. However, acoustic impacts during operations would be consistent with existing land use.
Other Terrestrial Biota	None	Impacts to other terrestrial biota are not expected due to the surrounding high-density industrial and urban area.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

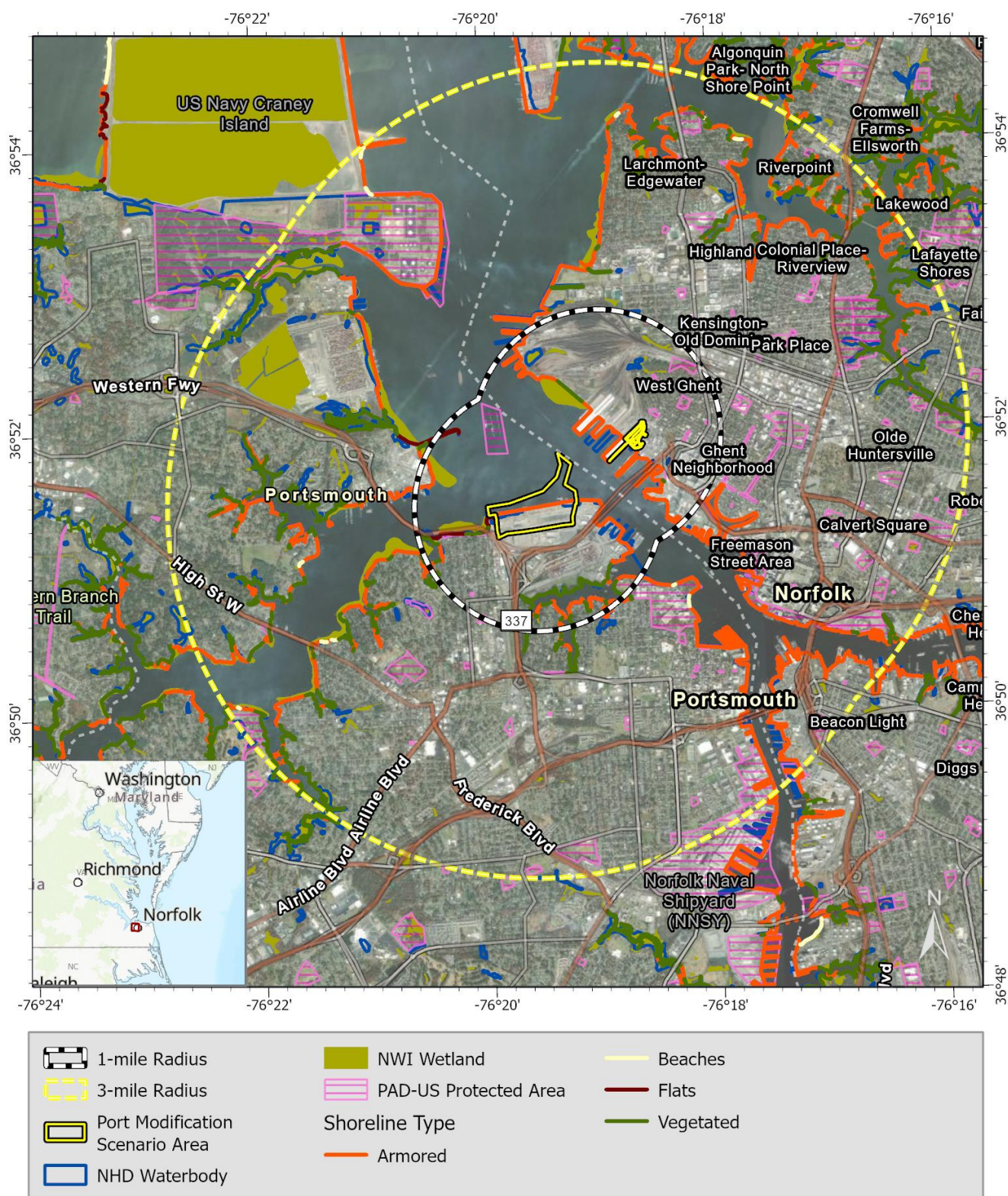


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2024b; USFWS 2023b; USGS 2022, 2024. Base map: Esri World Imagery.

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W
Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

- Coordinate with commercial fishing operators to adjust port operations and access, ensuring minimal interference with fishing activities.
- Implement strict scheduling for dredging and other noisy activities to occur during times that are least disruptive to fish behavior, based on the seasonal and daily patterns of local fish species.
- Use noise-reducing technologies and barriers to minimize underwater sound transmission from construction activities.
- Actively monitor fish populations and behavior to assess the impact of construction activities and adjust mitigation strategies as needed in real-time.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W
Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	Both sites are located in existing ports and industrialized areas. Land use within 5 miles of either port is primarily commercial and residential (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect surrounding land uses.
Infrastructure	LP-1/Chambers Field Naval Airport is within 5 miles of the ports. Norfolk International Airport and Hampton Roads Executive Airport are 6.5 and 8.5 miles from the modification scenario areas, respectively. I-264 is the nearest interstate and is less than 1 mile from the modification scenario areas. Large highways within 5 miles of the ports include I-464, I-564, I-64. There is an operational rail line on-site (Esri 2023).	None – terrestrial port modifications will be contained within port boundaries.	In the proposed port modification scenario, facilities would be within the existing port boundaries and would not affect existing infrastructure.
Special Use Areas	Twelve military use areas are located within 5 miles of the ports: Craney Island U.S. Naval Supply Center, U.S. Coast Guard Base Portsmouth, Naval Medical Center Portsmouth, Naval Support Activity Norfolk Naval Shipyard, Norfolk Naval Shipyard South Gate, Norfolk Naval Shipyard St. Helena, St. Julien's Creek Annex East, Naval Facilities Engineering Systems Command Atlantic, Fire Fighters School, an SDA Area, Naval Support Activity Hampton Roads, Naval Station Norfolk (which contains the LP-1/Chambers Field Naval Airport) (ArcGIS Online 2020).	Cranes interfering with airspace; increased maritime and terrestrial traffic congestion.	The addition of cranes at the port could potentially interfere with airspace for helicopters coming in and out of the Chambers Field Naval Airport, requiring coordination with the Federal Aviation Administration. Increased terrestrial and marine traffic could interfere with ground and maritime activities.
Visual	The existing terminal properties and equipment are visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes up to 300 feet tall during construction; lights and vessel activity during operation.	Port location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible, though are consistent with existing infrastructure.
Noise	Noise levels are high within 5 miles of the ports, ranging from 45 decibels to over 90 decibels. The highest noise is near the airports. Other sources are located along highways and rail corridors (USDOT 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. During operation; noise will be consistent with surrounding noise levels.
Air Quality	The EPA reports 3 of 5 air quality metrics within 5 miles of the ports are above the 50th percentile nationally. Nitrogen Dioxide, Diesel Particulate Matter, and Toxic Releases to Air are in the 66th, 71st, and 61st percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the ports is in the 72nd percentile nationally.	Project-related congestion.	The traffic associated with the creation of 316–424 jobs during construction and 400–600 during operation would not materially impact traffic patterns surrounding a port area that already employs 565,000.
Maritime Navigation	The nearest marine highways include the James River, Thimble Shoal Channel, and the Chesapeake Bay (USDOT 2018).	Increased maritime traffic.	The addition of 1 vessel per day combined for both ports during construction, and 1 vessel per day in Portsmouth and one every 10–30 days in Norfolk during operation, is unlikely to materially impact maritime navigation in a harbor that received nearly 2500 calls in 2019 (Hampton Roads Alliance 2024). This activity is likely to be easily managed within the harbor's existing operations.
Commercial Shipping	Portsmouth primarily functions as a container port, facilitating cargo shipments, breakbulk, and Ro/Ro operations (BVG Associates 2018). Norfolk specializes as a cargo port, processing breakbulk, coal, rubber, and wood products (Thalhimer 2022). In 2019, there were nearly 2,500 port calls recorded in the Hampton Roads harbor (Hampton Roads Alliance 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. Sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run. While no existing activities will be entirely displaced, their activities would be restricted to smaller areas of the ports.
Commercial Fishing	Hampton Roads is a "Top U.S." commercial fishing harbor, bringing in 9.7 million pounds and \$24.5 million in 2022 (NOAA 2022b). Engagement score: low to medium (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The project overlaps with a major U.S. commercial fishing harbor, potentially disrupting harbor activities. Increased aquatic noise and physical disturbances from construction equipment could materially impact commercially fished stocks. Noise and physical interruptions are expected to decrease after construction has ended.
Recreational Fishing	There are several recreational deep-sea fishing charters in and out of Hampton Roads. There are numerous onshore recreational fishing locations within 5 miles of the modification scenario areas, and several within 1 mile. Engagement score: high (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not directly overlap with regions of popular recreational fishing use, and there are plentiful options for recreational fishing nearby. Although the project is close to popular areas, the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	There are numerous local parks within 5 miles of the ports (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby recreational areas and boaters during construction and operation. Tall cranes would be visible from recreational areas.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Tourism	85,563 persons (9.9% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a). Both Portsmouth and Norfolk have historical downtown centers with walking tours of colonial-era architecture and developed waterside tourist centers.	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may reach nearby tourist centers, particularly the developed waterfronts, during construction and operation. Tall cranes would be visible from tourist centers.
Housing and Lodging	17,949 of the 57,315 housing units in the MSA are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.
Population	The population is 237,187 within 5 miles of the ports and is relatively moderate density. The population within the MSA is 1.8 million (USCB 2023c).	Potential in-migration associated with employment opportunities.	The addition of 316–424 workers during construction and 400–600 during operation would not materially increase MSA population of 1.8 million.
Labor Force and Employment	The civilian labor force of the MSA is 872,680 and employment is 834,843. The unemployment rate is 4.3% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of 316–424 workers during construction and 400–600 during operation would not materially increase the labor force or decrease unemployment.
Income Levels	The per-capita income is \$42,218 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	The addition of 316–424 jobs during construction and 400–600 during operation at prevailing wage levels would not materially alter income levels.
Community Cohesion	Portsmouth and Norfolk have community cohesion percentiles of 10 and 5, respectively. The four nearest counties have percentiles of 2, 3, 5, and 16, indicating cohesion in the area is below the national median (Chetty et al. 2022).	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for Virginia was \$3.8 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports 12 hospitals and 69 schools are within 5 miles of the port. 23.1% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively small as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

6 References

ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.

[BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.

Buljan A. 2022 Aug 16. USD 223 Million-Worth Construction Works Start at Portsmouth Marine Terminal. Offshore Wind. [accessed September 2024]. <https://www.offshorewind.biz/2022/08/16/usd-223-million-worth-construction-works-start-at-portsmouth-marine-terminal/>.

BVG Associates. 2018. The Virginia advantage: The roadmap for the offshore wind supply chain in Virginia. [accessed September 2024]. [https://energy.virginia.gov/offshore-wind/documents/BVGA-20802-Report-r2-final-20191127%20\(1\).pdf](https://energy.virginia.gov/offshore-wind/documents/BVGA-20802-Report-r2-final-20191127%20(1).pdf).

Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.

Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.

CP&O. 2024. CP&O is the premier operator at the Port of Virginia. [accessed June 2024]. <https://www.cpando.com/>.

Elkinton C, Blatiak A, and Ameen H. 2014. Assessment of Ports for Offshore Wind Development in the United States. Document no. 700694-USPO-R-03. U.S. Department of Energy. San Diego (CA): Garrad Hassan America, Inc. [accessed 23 September 2024]. https://www.energy.gov/sites/prod/files/2014/04/f14/wind_offshore_port_readiness.pdf.

[EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.

[EPA] U.S. Environmental Protection Agency. 2024a. Green Book – Virginia Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_va.html.

[EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.

Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.

Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.

Google Maps. 2024. 36°51'26.11"N, 76°19'32.73"W and 36°51'57.13"N, 76°19'0.64"W. Street View. [accessed 9 May 2024].

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Hampton Roads Alliance. 2023 Jun 30. Fairwinds Landing Begins Construction of Offshore Wind Monitoring & Coordination Center in Norfolk, VA. [accessed September 2024]. <https://hamptonroadsalliance.com/news/fairwinds-landing-begins-construction-of-offshore-wind-monitoring-coordination-center-in-norfolk-va/>.

Hampton Roads Alliance. 2024. Port of Virginia. [accessed September 2024]. <https://hamptonroadsalliance.com/port-of-virginia/>.

Maxim Cranes. 2023 Jul 6. Unlocking the Power of Gantry Cranes. [accessed August 2024]. <https://www.maximcrane.com/blog/unlocking-the-power-of-gantry-cranes/>.

Miller Group. 2022 May 5. Press Release: Fairwinds Landing leases Norfolk Southern's Lambert's Point Docks Property to serve wind and defense industries. [accessed August 2024]. <https://millergrpva.com/who-we-are/blog/articles/fairwinds-landing-leases-norfolk-southern-lamberts-point-docks-property-serve-wind-and-defense-industries>.

Miller Group. 2023 Jun 29. Press Release: Fairwinds Landing Begins Construction of Offshore Wind Monitoring and Coordination Center in Norfolk, Virginia. [accessed August 2024]. <https://millergrpva.com/who-we-are/blog/articles/FairwindsMCCGroundbreaking>.

Moffat & Nichol. 2023. State Land Commission's 2023 Alternative Port Assessment to Support Offshore Wind, Final Report. Prepared for the California State Lands Commission. Newton (MA): Moffat & Nichol. [accessed 10 June 2024]. <https://slcprdwordpressstorage.blob.core.windows.net/wordpressdata/2023/02/Alternative-Port-Assessment-To-Support-Offshore-Wind-Final.pdf>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

[NOAA] National Oceanic and Atmospheric Administration. 2012. Navigation Chart No. 12371. 25th ed. Last correction 7 November 2023.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024]. [https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:](https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344;)

[NOAA] National Oceanic and Atmospheric Administration. 2023a. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

[NOAA] National Oceanic and Atmospheric Administration. 2023c. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

[NOAA] National Oceanic and Atmospheric Administration. 2023d. Virginia 2005 ESI: Shoreline Types - Lines and Polygons [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 30 May 2023; accessed 6 May 2024]. <https://www.fisheries.noaa.gov/inport/item/40594>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

Norfolk Southern. 2024. Lambert's Point Docks Brochure. [accessed September 2024]. https://www.norfolksouthern.com/content/dam/nsCorp/pdf/LPD_brochure.pdf.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

[NYSERDA] New York State Energy Research and Development Authority. 2019. *2018 Ports Assessment: Offshore Wind Operations and Maintenance Port Facilities*. Final Report. Prepared by COWI North America, Inc. January.

Ports America. 2023. Norfolk, VA. [accessed 5 December 2023]. <https://www.portsamerica.com/locations/portofnorfolk-virginia>.

Sidersky R. 2023 Jun 29. Fairwinds Landing project breaks ground in Norfolk. *Virginia Business*. [accessed September 2024]. <https://www.virginiabusiness.com/article/fairwinds-landing-project-breaks-ground-in-norfolk/>.

Skanska. 2022 Aug 16. Press Release: Skanska selected to rebuild offshore wind staging port at Portsmouth Marine Terminal. [accessed September 2024]. <https://www.usa.skanska.com/who-we-are/media/press-releases/266239/Skanska-selected-to-rebuild-offshore-wind-staging-port-at-Portsmouth-Marine-Terminal->

S&P Global. 2024. Ports & Terminals Guide. [accessed 30 April 2024]. S&P Global Maritime Portal.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

Thalhimer. 2022 Aug 22. The Miller Group Leases Lambert's Point Docks, the Largest Privately-Held Multi-Modal Facility in the Norfolk Region. Prepared for Cushman & Wakefield. [accessed September 2024]. <https://thalhimer.com/marketwatch/our-blog/the-miller-group-leases-lamberts-point-docks-the/>.

[TNC] The Nature Conservancy. 2010. Mid-Atlantic Benthic Habitats. Boston: Eastern Resource Office of The Nature Conservancy. [accessed 4 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/benthic_habitats.html.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 4 May 2024].

https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

Transportation and Logistics International. 2014. The Ports of Virginia. [accessed 18 September 2024].

<https://tlimagazine.com/news/the-port-of-virginia/>.

[USACE] U.S. Army Corps of Engineers. 2023. Federal Public Notice NAO-2009-02374 – Portsmouth Marine Terminal, Portsmouth, Virginia. [published 11 January 2023; accessed August 2024].

<https://www.nao.usace.army.mil/Media/Public-Notices/Article/3260647/nao-2009-02374-portsmouth-marine-terminal-portsmouth-virginia/>.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024].

<https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024].

<https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for Virginia. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed 7 June 2024].

<https://fred.stlouisfed.org/series/QTAXTOTALQTAXCAT3MDNO#0>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024].

<https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024].

<https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024].

<https://fwsprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024].

<https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024].

<https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2016. Norfolk South Quadrangle map, 1:24,000 scale. [accessed 18 September 2024].

<https://www.anyplaceamerica.com/directory/va/portsmouth-city-51740/capes/pinner-point-1479334/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024].

<https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024].

<https://doi.org/10.5066/P96WBCHS>.

[VDHR] Virginia Department of Historic Resources. 2024. Virginia Cultural Resource Information System (VCRIS) [database]. [accessed 18 September 2024].

<https://www.dhr.virginia.gov/programs/vcris/>.

HAMPTON ROADS

Portsmouth Marine Terminal in Portsmouth, Virginia – 36°51'26.11"N, 76°19'32.73"W

Lambert's Point Docks in Norfolk, Virginia – 36°51'57.13"N, 76°19'0.64"W

Virginia Department of Environmental Management. 2020. Coastal Avian Protection Zone (CAPZ). [accessed 8 May 2024]. https://vgin.vdem.virginia.gov/datasets/680e51caba6348f1af812a795ac35a90_163/explore?location=36.782140%2C-76.196925%2C11.29.

Virginia Places. 2024. Ports of Virginia. [accessed 18 September 2024]. <http://www.virginiaplaces.org/transportation/shiptransport.html>.

Virginia Port Authority. 2023a. The Port of Virginia: Annual Comprehensive Financial Report for Fiscal Year ended June 30, 2023. [accessed Sep 2024]. <https://www.portofvirginia.com/wp-content/uploads/2023/10/Virginia-Port-Authority-06-30-2023-Annual-Comprehensive-Financial-Report.pdf>.

Virginia Port Authority. 2023b Oct 27. Creation of the Mid-Atlantic's Offshore Wind Logistics Hub Moves Forward at The Port of Virginia. The Port of Virginia. <https://www.portofvirginia.com/who-we-are/newsroom/creation-of-the-mid-atlantics-offshore-wind-logistics-hub-moves-forward-at-the-port-of-virginia/>.

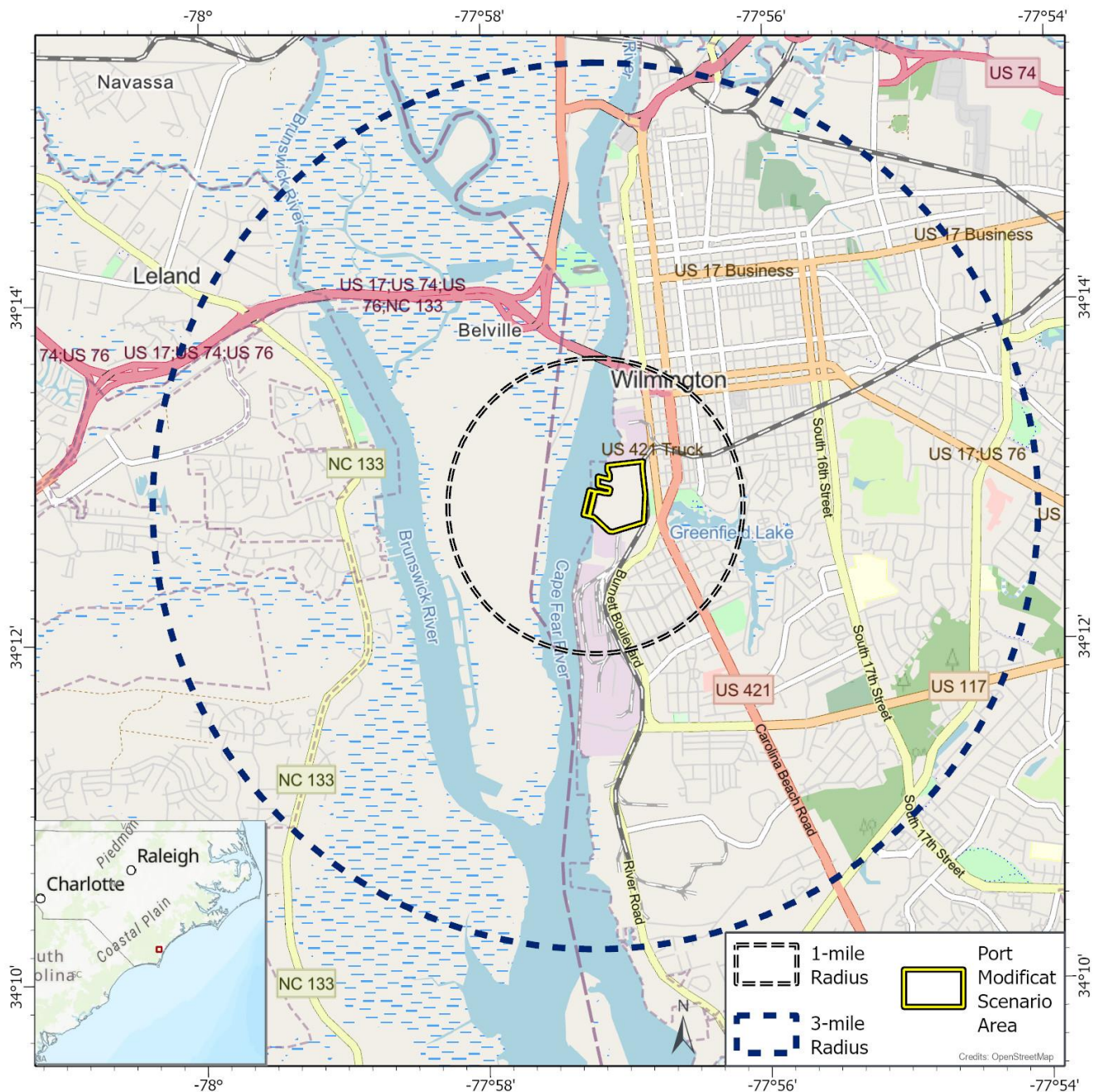
Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

WILMINGTON PORT PROFILE

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Bureau of Ocean Energy Management

December 18, 2024



WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

1 Port Overview

Owner:	North Carolina State Ports Authority (Ports America 2024)
Operator:	North Carolina State Ports Authority (Ports America 2024)
Primary Existing Uses:	Cargo and containers (North Carolina Ports 2024)
Primary Existing Cargo:	Container, bulk, breakbulk, and Ro/Ro operations (North Carolina Ports 2024)
Existing Port Employment	41,200 (Head et al. 2018)
Typical Operating Hours:	6 a.m. to 5 p.m. (Ports America 2024)
Terminal Land Area:	284 acres (North Carolina Ports 2024)
Closest Wind Energy Lease Area:	TotalEnergies Carolina Long Bay, LLC (OCS-A 0545)
Distance to Closest Lease Area:	Approximately 57 nautical miles
Potential Offshore Wind Port Uses:	Marshalling and staging (BVG Associates LLP [BVG] 2021)

The Port of Wilmington, North Carolina, is one of only two deepwater ports in North Carolina and is located on the eastern banks of the Cape Fear River (BVG 2021). The port occupies over 275 acres, including 125 acres of open storage area and over 1 million square feet of warehouse storage (Ports America 2024). The port has nine existing berths, consisting of two container berths and seven berths for general cargo (Ports America 2024).

The Port of Wilmington includes approximately 6,740 linear feet of existing wharf frontage and has seven container cranes, two gantry cranes, and primarily manages containers, bulk, breakbulk, and roll-on/roll-off (Ro/Ro) operations (North Carolina Ports 2024). The Port of Wilmington is located approximately 26 miles from the open ocean and has an air draft restriction of 212 feet due to the presence of Duke Energy electrical lines that span the Cape Fear River (BVG 2021). The port has intermodal rail services provided by CSX Transportation and direct access to U.S. Highways 17, 117, 74, 421, I-40, and I-140 (BVG 2021). The Wilmington International Airport is located approximately 4 miles to the northeast, which also restricts air clearance for activities at the port to 400 feet.

The Port of Wilmington is owned and operated by North Carolina State Ports Authority, which has responsibility for vessel scheduling, general management of the port, safety, and cargo transfer operations (Ports America 2024). In 2020, the Water Resources Development Act included \$834 million to fund the Wilmington Harbor Navigation Improvement Project, which would deepen the port's navigational channel from 42 feet to 47 feet to accommodate deep-draft offshore wind vessels (BVG 2021).

In 2021, the North Carolina Department of Commerce commissioned BVG Associates (BVG) to provide guidance to the state on emerging offshore wind economic opportunities, which included an assessment of sites within North Carolina ports to support offshore wind (BVG 2021). In 2022, the Bureau of Ocean Energy Management auctioned off two offshore wind energy lease areas to TotalEnergies Renewable USA and to Duke Energy Renewables Wind located approximately 20 nautical miles south of the North Carolina coast (Orona 2022). To support the construction of the two offshore wind farms, a staging and marshaling port is recommended by BVG to be constructed at a site within the Port of Wilmington or at another North Carolina port (e.g., Morehead City) (BVG 2021).

Existing capabilities are summarized in Table 1-1.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	500
	Port Access Channel Controlling Depth (feet)	42
	Overhead / Air Draft Restriction (feet)	212
	Number of Berths	9
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	9.8–19.5 (estimated) (BVG 2021)
	Length (feet)	6,740
	Depth (feet)	38–42
	Suitable for Spud-Jacking (Yes/No)	Unknown (site not assessed) (Elkinton et al. 2014)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	125
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	9.8–19.5 (estimated) (BVG 2021)
	Haul Route Area Bearing Capacity (mt/m ²)	9.8–19.5 (estimated) (BVG 2021)
	Approx. Size of Covered Storage Area (acres)	23
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	Yes
	Width of Ro/Ro Berth (feet)	n/a (varies by vessel, no built-in ramp)
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	9.8–19.5 (estimated) (BVG 2021)
Cranes	Lifting Capacity (mt)	Up to 100 and 150
	Height Restrictions (Yes/No)	Yes (212 feet)
Transportation	On-Site Rail (Yes/No)	Yes (BVG 2021)
	On-Site Highway (Yes/No)	Yes (BVG 2021)

Source: North Carolina Ports (2021), unless otherwise indicated.

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

Several sites within the Port of Wilmington were assessed in the BVG report *Building North Carolina's Offshore Wind Supply Chain* (BVG 2021), which was developed for the North Carolina Department of Commerce, including a proposed conceptual design for a staging and marshaling port at the North Property, a vacant, undeveloped 100-acre parcel immediately north of the existing port facilities and owned by the North Carolina State Ports Authority (BVG 2021). The site is located adjacent to the Cape Fear River navigation channel and would be air draft restricted at 212 feet by overhead electrical lines that span the Cape Fear River downstream of the site (BVG 2021).

Modifications proposed by BVG for building out the North Property site as a staging and marshaling port include dredging a turning basin and berthing area; construction of a 900-linear-foot concrete relieving platform to act as a quay for heavy-lift operations; development of an up to 75-acre storage and laydown yard; construction of a fabrication and assembly building and an operations & maintenance (O&M) support facility; and construction of a bulkhead to support potential Crew Transfer Vessels (CTVs) or Service Operation Vessels (SOVs) for O&M activities (BVG 2021).

Modifications required to provide sufficient access to the North Property include dredging a 200-foot-wide basin for vessel berthing adjacent to the proposed 900-linear-foot quay. The dredging would target a depth of 40 feet, which is slightly shallower than the adjacent Cape Fear River federal navigation channel (42 feet). Based on a review of hydrographic survey data collected by the U.S. Army Corps of Engineers (USACE) adjacent to the proposed dredge footprint, depths outside the channel within the area proposed for dredging range from 32 to 5 feet (USACE 2024). Assuming an estimated average existing depth of 15 feet, and the proposed 40-foot target depth, as much as 180,000 cubic yards of sediment removal may be required. It is assumed that dredging would be conducted using mechanical means and dredged material would be disposed of at the New Wilmington Ocean Dredged Material Disposal Site, consistent with previous dredging events conducted for the port (BVG 2021). If disposal of the dredged material occurs at the offshore dump site, no dewatering or stabilization of the dredged material would be expected.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Modifications required to construct the quay include the construction of a 900-foot-long by 50-foot-wide concrete relieving platform. The platform would be developed by driving steel piles and constructing a steel rebar supported 4-foot-thick concrete deck. Based on BVG (2021), it is assumed that the target ground-bearing capacity for the quays would be up to 6,000 psf to support heavy-lift operations via use of mobile cranes.

Modifications required to prepare the upland portion of the North Property, which would be used for component storage and assembly, include clearing and grading of the existing site, potentially including using processed dredged material as fill. Following grading, a thick layer of dense graded aggregate (DGA) would be placed and compacted to increase the ground-bearing capacity to allow for the use of self-propelled modular transporters to move components around the site (BVG 2021). It is assumed that a layer up to 3 feet thick of DGA would be placed to achieve target ground-bearing capacities of up to 4,000 psf (BVG 2021).

Modifications required to construct a bulkhead and berths for CTVs or SOVs would include the driving of steel sheet piles, placement and compaction of fill behind the sheet pile walls, and either the construction of a steel rebar-supported concrete deck or placement and compaction of DGA consistent with methods described for the upland storage areas.

The concept document (BVG 2021) also notes the potential for the construction of two buildings, a 13.8-acre fabrication and assembly building and 3.2-acre O&M activities support building. Additional modifications and improvements required to build out the North Property would include the installation of high mast lighting, stormwater management systems, and security upgrades (e.g., fencing and gates).

As noted, the North Property has a 212-foot air draft restriction from overhead electrical lines between the site and the open ocean (BVG 2021).

The primary impact driver during operation would be an increased operational tempo, such as an increase in ships calling (i.e., the existing site is undeveloped and all new ship traffic would represent an increase in emissions), an increase in local terrestrial cargo transportation (i.e., cargo and storage operations for wind turbine components), and associated worker activities.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in New Hanover County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: New Hanover County, North Carolina, includes urban areas with a moderate population density and a sizable industrial base. Emission sources within the boundaries of New Hanover County, within the region, and within neighboring metropolitan areas affect the county's air quality. The New Hanover County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with stationary emission sources being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from natural processes, miscellaneous categories, and highway vehicles (U.S. Environmental Protection Agency [EPA] 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for New Hanover County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	78	16	3	–	–
Biogenics*	492	104	–	–	–	4,580	396	–
Dust	–	–	–	466	76	–	–	–
Fires	45	1	–	5	4	11	2	523
Fuel Combustion	885	165	5	152	146	127	45	–
Industrial Processes§	–	–	–	–	–	64	3	–
Miscellaneous†	522	18	4	344	316	2,008	344	–

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Mobile	16,825	1,920	16	169	88	1,127	328	1,006,642
Point-Sources	455	1,060	229	262	227	203	111	19,107,710
Total	19,224	3,268	254	1,476	873	8,117	1,229	20,114,875

Source: EPA (2023).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in New Hanover County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While New Hanover County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in New Hanover County reported an O₃ design value of 58.3 parts per billion (ppb) on average for the 2019 to 2021 period, 58.0 ppb on average for the 2020 to 2022 period, and 62.3 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 6 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	23.56	45.12	0.09	1.84	1.15	1.12	–	9,370.81
Nonroad Emissions	15.78	42.51	0.06	2.99	2.53	2.45	1.45	18,111.12
On-Road Emissions	19.70	1.44	0.01	0.25	15.27	1.94	0.07	2,025.65
Fugitive Dust	–	–	–	–	27.43	2.74	–	–
Total	59.04	89.07	0.16	5.08	46.38	8.25	1.52	29,507.58

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from port modifications would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	189.45
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.30	0.02	<0.01	<0.01	0.24	0.03	<0.01	31.82
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.14
Total	0.90	0.64	<0.01	0.02	0.25	0.04	<0.01	276.35

Note: May not sum to total due to rounding. CO_{2e} = carbon dioxide equivalent; MTPy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 91.45 kilometers. While the airshed is currently in attainment, or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from construction activities; however, the port modifications would also generate long-term, beneficial, direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or O&M. These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The North Property at the Port of Wilmington is within New Hanover County, North Carolina, situated along the eastern bank of the Cape Fear River, and surrounded by myriad historic resources (National Park Service [NPS] 2024; North Carolina Historic Preservation Office [NCHPO] 2024). In-person review of the confidential NCHPO site files database and publicly available reference sources identified multiple previously documented cultural resource inventory points consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects within a 3-mile radius surrounding the modification scenario area (NCHPO 2024; NPS 2024). These inventory points consisted of archaeological sites, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal levels (NCHPO 2024; NPS 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area is a 284-acre site north of the confluence of the Brunswick and Cape Fear Rivers (Google Earth 2024; North Carolina Ports 2024). Explored by Verrazano in the 1520s and established under a succession of names beginning in the 1730s, the Wilmington area was eventually developed into a shipping and railroad hub in the nineteenth and early twentieth centuries, with commodities such as timber and rice moving through the port (Advisory Council on Historic Preservation 2024; North Carolina Ports 2024; Wilmington and Beaches CVB 2024). After the Civil War (post-1865), the region became an economic center for Africans and African Americans who had been freed from slavery and their descendants, with incidents of racial violence arising at the turn of the twentieth century (Historic Wilmington Foundation 2024; Hurtado et al. 2022; Wilmington and Beaches CVB 2024). During World War II (1941–1945), the region became a major center for shipbuilding, supplying vessels for the war effort, and Wilmington was recently recognized as the first World War II Heritage City in the United States for those historical connections (Hurtado et al. 2022; Wilmington and Beaches CVB 2024).

Based on recent aerial photographs, the North Property encompasses a wooded parcel bounded by the Cape Fear River on the west and Greenfield Creek on the south. To the east, an existing rail line separates the modification scenario area from commercial and residential neighborhoods beyond South Front Street (Google Earth 2024). To the north, an industrial and commercial park with more than two dozen storage tanks, warehouses, and buildings of late nineteenth to mid-twentieth century periods and more recent (Google Earth 2024). The modification scenario area faces Eagle Island and the Cape Fear River to the west and is undeveloped except for unpaved single-lane track roads and several stands of mature trees and vegetation (Google Earth 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Native American Pre-Contact, Contact, and Post-Contact period and Historic period archaeological sites, are known to occur within a 3-mile radius of the modification scenario area, with 101 sites identified in the confidential site files database reviewed in person (NCHPO 2024). Of these inventoried archaeological resources, 32 are listed on the NRHP and two are eligible for the NRHP (NCHPO 2024; NPS 2024). These archaeological resources include 13 multicomponent sites, 22 Pre-Contact camp sites and lithic scatters, 64 Post-Contact structures, one cemetery, and one Civil War-era battlefield (NCHPO 2024; NPS 2024). Older soils may persist in this area undisturbed by previous port, railway, or building construction and existing riverway developments.

Marine Archaeological Resources: Within the 3-mile radius, there are four unnamed shipwrecks or submerged obstructions and 24 named or identified marine archaeological sites (National Oceanic and Atmospheric Administration [NOAA] 2024a; NCHPO 2024). The named and identified archaeological sites are contributing

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

elements to the Wilmington Historic and Archaeological District located to the north of the modification scenario area (NCHPO 2024; NPS 2024). There are no named or mapped shipwrecks or submerged obstructions identified within 1 mile, based on the confidential site files database reviewed in person. However, several submerged obstructions appear on recent satellite imagery to the east of the North Property within the Cape Fear River (Google Earth 2024; NOAA 2024a).

Aboveground Historic Resources: Within a 3-mile radius, there are more than 2,850 aboveground inventory points listed in the NCHPO's publicly available historic resources database (NCHPO 2024; NPS 2024). These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, foundries), and municipal facilities. Of these resources, seven are individually listed on the NRHP and 12 are eligible (NCHPO 2024; NPS 2024). There are eight NRHP-listed National Register Historic Districts, four NRHP-eligible National Historic Districts, and one National Historic Landmark within a 3-mile radius (NCHPO 2024; NPS 2024).

Within 1 mile, there are 132 previously documented cultural resource inventory points (NCHPO 2024). These resources consist of aboveground historic areas, buildings, structures, or objects inventoried on local, state, or federal lists (NCHPO 2024; NPS 2024). Of these, the William Hooper School is the only individually listed resource on the NRHP; four additional resources are considered eligible for the NRHP (NCHPO 2024; NPS 2024). One National Historic District, the Sunset Park Historic District, is within 1 mile and south of the modification scenario area. One National Historic District, the Wilmington Historic and Archaeological District, is just beyond 1 mile to the north of the modification scenario area (NCHPO 2024; NPS 2024). This Historic District encompasses more than 900 contributing historic buildings or sites situated within the community of Wilmington and New Hanover on both sides of the Cape Fear River (NCHPO 2024; NPS 2024). This historic property data indicates a relatively high frequency of aboveground historic resources.

Cultural Resources Potential: Aerial imagery and historic topographic map reviews of a 1-mile radius surrounding the modification scenario area indicates the presence of numerous NRHP-listed, state-listed, and inventoried cultural resources and historic structures (Google Earth 2024; NCHPO 2024). These areas include the Wilmington Historic and Archaeological District and the Sunset Park Historic District within the Woodlawn, Summer Hills, Lake Forest, and Jervay Place neighborhoods. The majority of the buildings appear to date from the nineteenth century or later (Google Earth 2024; NCHPO 2024). Many of these historic areas, buildings, and structures within the 1-mile radius relate to the emergence of the Wilmington as a historic center for shipping, railroads, industry, and social movements during the eighteenth through twentieth centuries (NCHPO 2024; NPS 2024).

Unknown terrestrial archaeological sites are of moderate potential in the modification scenario area and surrounding areas and could also occur adjacent in more deeply buried terrestrial and riverbank deposits or in undisturbed natural areas (intact riverbank sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Port modifications are likely to disturb sediment within terrestrial habitats or additional shoreline or riverbed sediments with a capability of retaining buried archaeological sites, of which an unknown portion around the modification scenario area represent previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks and obstructions were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in riverbed and channel sediments that are undisturbed by previous dredging, excavation, or erosion. Port modifications could affect riverbank and channel sediments, which could be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by potential port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats ^{1,16,18}	• Located on the Cape Fear River on undeveloped land. • Modification scenario area is occupied by tidal marsh, forested wetlands and evergreen forest. • Existing port infrastructure is located adjacent to the modification scenario area to the south. • High- to low- density residential areas, additional wetlands, and forested areas are mixed in the landscape within 1 mile. • Additional wetlands, forests, and streams within 3 miles.
Shoreline Habitats ⁸	• Within the modification scenario area, shorelines adjacent to the north and south, and shorelines along the opposite riverbank, tidal marsh is the predominant shoreline category. • Additional vegetated bank and armored shoreline within the modification scenario area. • Isolated sections of manmade/armored shorelines are found within 1 mile.
Submerged Marine Habitats ^{9,10,11,14}	• No Submerged Aquatic Vegetation within 3 miles of modification scenario area.
Designated Habitats / Places ^{2,3,5,6,7,15,19}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Summer Flounder, Scup, Black Sea Bass; Bluefish; Snapper-Grouper; Spinner Shark • Habitat Area of Particular Concern (HAPC) for Snapper-Grouper and Penaeid Shrimp within 1 mile. • Eagles Island Important Bird Area located within 1 mile of modification scenario area. • Proposed Critical Habitat for green sea turtles (swimming only). • Biologically Important Areas (marine mammals) for Bottlenose Dolphins identified within 3 miles.
ESA Listed Species ^{4,17}	• Northern long-eared bat and tricolored bat: forested habitat and flyways within 3 miles. • West Indian manatee may occur within 1 mile. • Piping plover may occur within 1 mile. • Red cockaded woodpecker; forested habitat and flyways within 1 mile. • Rufa red knot: marsh habitat within 1 mile. • American alligator may occur within 1 mile. • Shortnose and Atlantic sturgeon may occur within 1 mile. • Green, Kemp's ridley, and loggerhead sea turtles may occur within 1 mile. • Magnificent ramshorn may occur within 1 mile. • Bog turtle may occur within 1 mile. • Cooley's meadowrue may occur within 1 mile. • Golden sedge may occur within 3 miles. • Rough-leaved loosestrife may occur within 1 mile.
Migratory Birds and Eagles ¹⁷	• Bald eagles, along with 15 species of migratory birds (some with state protections), have suitable habitat within 1 mile.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Resource Category	Existing Conditions
Marine Mammals ^{5,7}	Atlantic bottlenose dolphins and harbor porpoises likely near modification scenario area, in addition to the potential occurrence of Endangered Species Act (ESA)–protected marine mammals.
State Specific Resources ^{12,13}	- The Cape Fear River identified as a “Very High” quality Natural Area, and the modification scenario area is located just east of an “Exceptional” quality Natural Area. - Approximately 2,080 acres of state/county parks and conservation areas within 1 mile of the modification scenario area.

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021; ²National Audubon Society 2024; ³National Oceanic and Atmospheric Administration (NOAA) 2021; ⁴NOAA 2022a; ⁵NOAA 2023a; ⁶NOAA 2023b; ⁷NOAA 2023c; ⁸NOAA 2024b; ⁹North Carolina Division of Marine Fisheries (NCDMF) 2022; ¹⁰NCDMF 2023a; ¹¹NCDMF 2023b; ¹²North Carolina Natural Heritage Program (NCNHP) 2023; ¹³NCNHP 2024; ¹⁴The Nature Conservancy 2019; ¹⁵United States Fish and Wildlife Service (USFWS) 2023a; ¹⁶USFWS 2023b; ¹⁷USFWS 2024; ¹⁸U.S. Geological Survey (USGS) 2022; ¹⁹USGS 2024.

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition; dewatering	Sediment disturbance and temporary increase in turbidity for dredging, pile driving/drilling, and coffer dam dewatering associated with new berth construction.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of ~54 acres due to clearing for fill excavation, infrastructure, and access.
Onshore Aquatic Habitats	Aquatic habitat alteration	Permanent loss of ~30 acres of tidal and forested wetlands for onshore infrastructure and access.
Shoreline	Habitat alteration	Permanent loss of tidal marsh and vegetated bank shoreline and a small section of riprap within the modification scenario area; however, the marsh shoreline type is fairly ubiquitous along both banks of the river.
Submerged Marine Habitats / Benthic Resources	Habitat alteration	Permanent loss of ~3 acres of benthic habitat and resources for the construction of the offshore infrastructure; inclusive of Snapper-Grouper and Penaeid Shrimp HAPCs which is ubiquitous throughout the region. Temporary loss of ~4 acres of benthic habitat due to dredging for construction of berths.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts due to pile driving activities and construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. Small non-ESA species within range of acoustic disturbances and vessel interactions.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts due to pile driving activities and construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances. However, acoustic impacts during operations would be similar to the existing land use within 1 mile.
Other Terrestrial Biota	Terrestrial noise	Impacts due to construction and operations noise; however, acoustic impacts during operations would be consistent with surrounding existing land use within 1 mile.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, “Port Overview.”

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

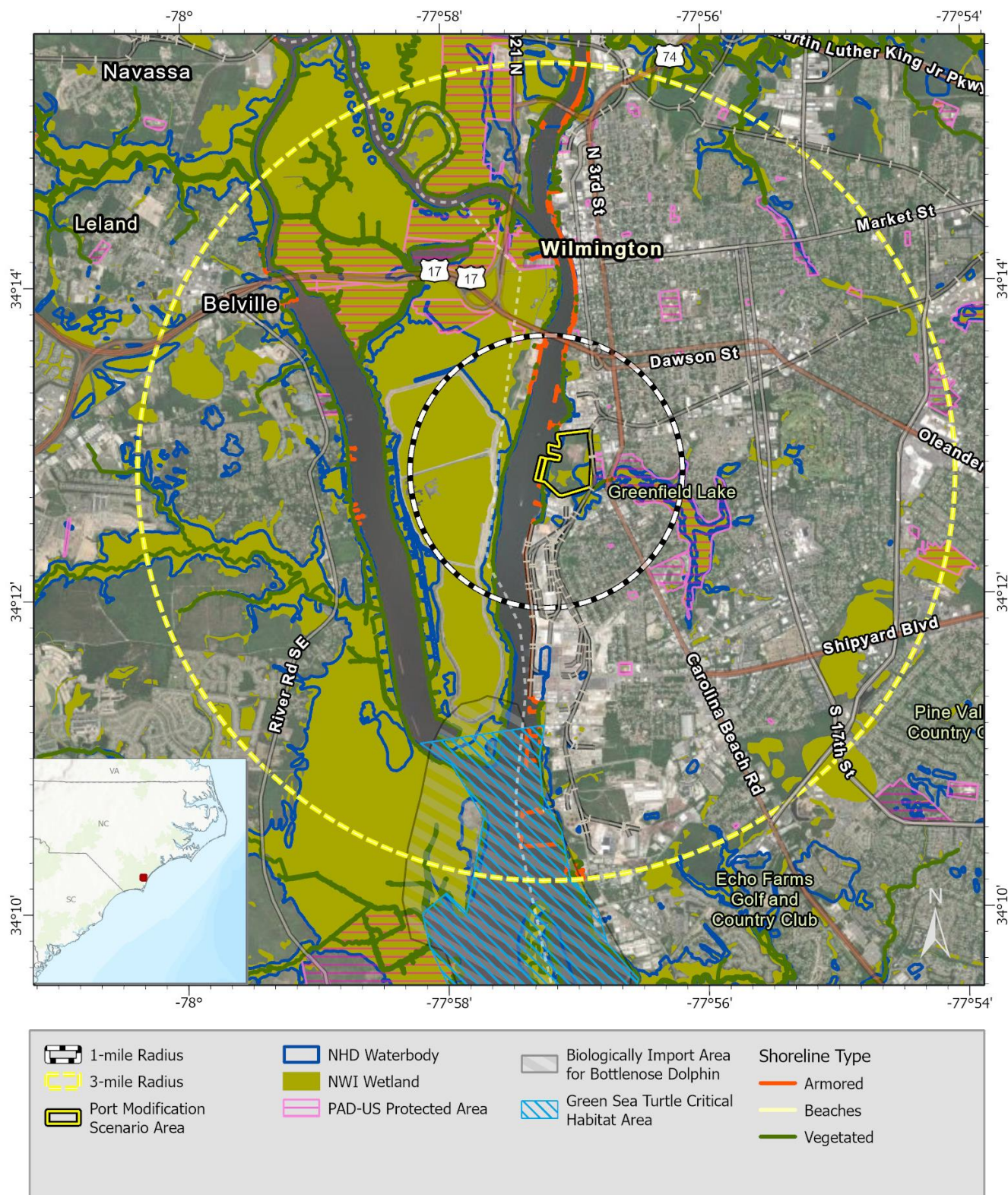


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2023b, 2023c, 2024c; USFWS 2023b; USGS 2022, 2024. Base map: Esri World Imagery.

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	The site of the proposed port is currently undeveloped. Land use within 5 miles of the port is primarily mixed commercial and residential, with industrial uses immediately adjacent to the port (Esri 2023).	Approximately 82.95 acres will be permanently converted from natural land and habitats to developed area, including 65.95 acres for quayside and storage areas and approximately 17 acres for facilities.	Alteration of natural buffers increases vulnerability to storm surges and flooding, with potential socioeconomic impacts on local communities due to increased erosion, altered drainage, and loss of natural resource availability. However, the buffering capabilities in surrounding areas, which feature similar land use, are likely to be sufficient, suggesting minimal significant socioeconomic impacts. No further changes to land use are anticipated after construction.
Infrastructure	The Wilmington International Airport is located approximately 4 miles away. I-140 is the nearest interstate and is just over 5 miles from the port. Large highways within 5 miles of the port include US 421, US 17, US 74, and US 117 (Esri 2023).	None; local infrastructure unaltered.	In the proposed port modification scenario, existing infrastructure would be unaltered.
Special Use Areas	There are no military use areas within 5 miles of the port (ArcGIS Online 2020).	None.	In the proposed port modification scenario, special use areas would not be affected.
Visual	The port property and equipment may be visible from nearby residential, commercial, and recreational areas (Google Maps 2024).	Cranes up to 300 feet tall during construction; lights and vessel activity during operation.	Port location and intervening landscapes reduce visibility; tall cranes and operational lighting may be visible, though are consistent with existing infrastructure.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. During operation; noise will be consistent with noise levels of the adjacent industrial park.
Air Quality	The EPA reports 1 of 5 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Toxic Releases to Air is in the 74th percentile nationally. Asthma risk is in the 55th percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 60th percentile nationally.	Project-related congestion.	The impact on traffic flows of the addition of 100–200 workers during construction and 200–400 during operation would be immaterial to a port that currently employs 41,200.
Maritime Navigation	The nearest marine highway is the Atlantic Deep Water Spine (USDOT 2018).	Increased maritime traffic.	During construction and operation additional vessel traffic may be required for delivery of materials or equipment. The impact during operation would be contingent upon the number of projects that utilize the port.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Commercial Shipping	The Port of Wilmington offers a broad range of capabilities, including container services, bulk, breakbulk, Ro/Ro, reefer, inland transportation, and cold storage, and it operates within a foreign trade zone. Its primary products include grains, wood products, chemicals, fertilizers, furniture, apparel, and automotive parts. Rail and road transportation facilities are available on site. The Port of Wilmington receives over 1,000 port calls each year (North Carolina Ports 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Additional vessel traffic would be required during construction and operation. With over 1,000 port calls annually, the port has the ability to mitigate any potential maritime congestion issues from the additional port call every 10–30 days during operation by shifting the timing and location of port calls over the long run.
Commercial Fishing	Wilmington is not a top U.S. commercial fishing port (NOAA 2022b). Engagement score: high (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with commercial fishing ports/harbors. While there is commercial fishing activity in and out of the Port of Wilmington and the increase in maritime traffic associated with the project operation could occasionally affect these activities, significant disruptions are not anticipated. Material impacts to commercially fished stocks are not anticipated.
Recreational Fishing	There are several recreational deep-sea fishing charters in and out of the Port of Wilmington. There are numerous onshore recreational fishing locations within 1 mile of the site. Engagement score: medium-high (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	The modification scenario area does not overlap with regions of popular recreational fishing use, and there are plentiful options for recreational fishing nearby. Although the project is close to popular areas, the material impacts on recreationally fished stocks are expected to be minimal, with limited disruption to recreational fishing activities anticipated.
Recreational Resources	There are parks/protected areas, including state, county, and city park land, conservation areas, and land trust easements, within 5 miles of the port (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions may extend to nearby recreational areas, potentially affecting the natural ambiance and experience for visitors and boaters, though are expected to be consistent with current levels. Additionally, tall cranes associated with the project would be visible from these recreational spots, possibly impacting the scenic view.
Tourism	16,324 persons (11.3% of employed persons) within the MSA are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a). Visitor spending totaled \$1.12 billion in 2023.	Air and noise emissions, visual alterations, terrestrial traffic.	The addition of 100–200 workers during construction and 200–400 during operation would not materially impact tourism in an area that received over \$1 billion in visitor spending in 2023.
Housing and Lodging	8,823 of 52,447 vacant housing units in the MSA are available for rent. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	Housing and lodging are likely adequate for project workers during construction and operation with relatively little conflict.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Population	The population is 105,124 within 5 miles of the port and is relatively moderate density. The population within the MSA is 289,726 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The addition of 100–200 workers during construction and 200–400 workers during operation would be immaterial to a nearly 290,000-person population.
Labor Force and Employment	The civilian labor force of the MSA is 152,497 and employment is 144,748. The unemployment rate is 5.1% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	A workforce of up to 200 workers during construction and 400 workers during operation would not materially increase a labor force of over 152,000 or impact the unemployment rate.
Income Levels	The per-capita income is \$41,885 within the MSA (USCB 2023a).	Increased labor demand puts upward pressure on wages.	A workforce of up to 200 workers during construction and 400 during operation at prevailing wage levels would not materially alter income levels.
Community Cohesion	The county containing the modification scenario area (Wilmington County) ranks in the 11th percentile on the national Community Cohesion Index, as reported by Chetty et al. (2022). The four adjacent counties also show below-median cohesion, with Community Cohesion Index percentiles of 16, 30, 71, and 75.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for North Carolina was \$3.9 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports one hospital and 27 schools are within 5 miles of the port. Nearly 23% of the MSA population is employed in “educational, health care, and social services” (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be relatively minor as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

6 References

- Advisory Council on Historic Preservation. 2024. Wilmington, North Carolina. [accessed 30 September 2024]. <https://www.achp.gov/preserve-america/community/wilmington-north-carolina>.
- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- [BVG] BVG Associates LLP. 2021. Building North Carolina's Offshore Wind Supply Chain. March. [accessed August 2024]. <https://www.commerce.nc.gov/report-building-north-carolinas-offshore-wind-supply-chain/download?attachment>.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Elkinton C, Blatiak A, Ameen H. 2014. Assessment of Ports for Offshore Wind Development in the United States. Document no. 700694-USPO-R-03. U.S. Department of Energy. San Diego (CA): Garrad Hassan America, Inc. [accessed 23 September 2024]. https://www.energy.gov/sites/prod/files/2014/04/f14/wind_offshore_port_readiness.pdf.
- [EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – North Carolina Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_nc.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 34°12'47.94"N, 77°57'12.78"W. Street View. [accessed 9 May 2024].
- Head W, Bert S, and Findley D. 2018. North Carolina Ports: 2018 Economic Contribution Study. Prepared for the North Carolina State Ports Authority. North Carolina State University, Institute for Transportation Research and Education. [accessed August 2024]. https://connect.ncdot.gov/resources/PORTS2022/Documents/NCPorts_RAISE22_Intermodal_Economic_Contribution_Report.pdf.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

Historic Wilmington Foundation. 2024. Preservation Equity Fund. [accessed 30 September 2024]. <https://historicwilmington.org/preservation-equity-fund/>.

Hurtado M, Ryerson J, and Wagner E. 2022. Places of World War II History, Wilmington, North Carolina. National Park Service Cultural Resources Office of Interpretation and Education. [accessed 1 October 2024]. <https://www.nps.gov/articles/000/places-of-wwii-history-in-wilmington-north-carolina.htm>.

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024]. <https://www.audubon.org/important-bird-areas>.

[NCDMF] North Carolina Division of Marine Fisheries. 2022. Submerged Aquatic Vegetation (SAV) 2019-2020 Mapping. [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/ncdenr::submerged-aquatic-vegetation-sav-2019-2020-mapping/about>.

[NCDMF] North Carolina Division of Marine Fisheries. 2023a. Estuarine Benthic Habitat Mapping Areas (Iteration 1). [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/nconemap::estuarine-benthic-habitat-mapping-areas-iteration-2/about>.

[NCDMF] North Carolina Division of Marine Fisheries. 2023b. Estuarine Benthic Habitat Mapping Areas (Iteration 2). [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/nconemap::estuarine-benthic-habitat-mapping-areas-iteration-2/about>.

[NCHPO] North Carolina Historic Preservation Office. 2024. Historic Preservation Office Web 2.0 database. [accessed 27 September 2024]. <https://nc.maps.arcgis.com/home/item.html?id=d2d04d8d7e03403f889419526e682529https://nc.maps.arcgis.com/apps/webappviewer/index.html?id=d2d04d8d7e03403f889419526e682529>.

[NCNHP] North Carolina Natural Heritage Program. 2023. Biodiversity and Wildlife Habitat Assessment. [accessed 10 May 2024]. <https://www.nconemap.gov/maps/1c489a78c56c4d84bffe558cc570e6/about>.

[NCNHP] North Carolina Natural Heritage Program. 2024. NHP Natural Areas. [accessed 10 May 2024]. <https://www.nconemap.gov/maps/NC::north-carolina-natural-heritage-program-natural-areas/about>.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 September 2024]. <https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344:>.

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. North Carolina 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2024c. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

North Carolina Ports. 2021. Facilities Guide. [accessed September 2024]. https://ncports.com/wp-content/uploads/2021/10/Facilities_Guide_5.0_Oct.2021.pdf.

North Carolina Ports. 2024. Port of Wilmington. [accessed September 2024]. <https://ncports.com/port-facilities/port-of-wilmington/>.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Orona J. 2022. These two companies paid \$315 million to develop wind energy off the Brunswick coast. StarNews Online 12 May. [accessed August 2024]. <https://www.starnewsonline.com/story/news/2022/05/12/boem-auctions-wind-energy-site-off-brunswick-coast-315-million/9743880002/>.

Ports America. 2024. Wilmington, NC. [accessed September 2024]. <https://www.portsamerica.com/our-locations/wilmington-nc?terminal=port-of-wilmington-nc>.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 4 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

[USACE] U.S. Army Corps of Engineers. 2024. Wilmington District Hydrographic Survey. Anchorage Basin. [updated 9 September 2024; accessed 24 September 2024]. https://eft.usace.army.mil/saw-nav/WILMINGTON_HARBOR/ANCHORAGE_BASIN/Anchorage.pdf.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

WILMINGTON

North Property in Wilmington, North Carolina – 34°12'47.94"N, 77°57'12.78"W

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2024. State Tax Collections: Total Taxes for North Carolina. Data retrieved from Federal Reserve Bank of St. Louis [FRED]. [accessed September 2024]. <https://fred.stlouisfed.org/series/QTAXTOTALQTAXCAT3NCNO>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

Wilmington and Beaches CVB. 2024. Historical Overview. [accessed 30 September 2024]. <https://www.wilmingtonandbeaches.com/about/area-information/historical-overview/>.

Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.

MOREHEAD CITY PORT PROFILE

Radio Island at the Port of Morehead City, North Carolina – $34^{\circ}42'40.79''\text{N}$,
 $76^{\circ}41'16.83''\text{W}$

Bureau of Ocean Energy Management

December 18, 2024



MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

1 Port Overview

Owner:	North Carolina State Ports Authority (NCSPA) (2024)
Operator:	North Carolina State Ports Authority (NCSPA 2024)
Primary Existing Uses:	Site is currently not in use (NCSPA 2024)
Primary Existing Cargo:	None
Existing Port Employment	None
Typical Operating Hours:	None
Terminal Land Area:	154 acres (NCSPA 2024)
Closest Wind Energy Lease Area:	Cinergy Corp. (a subsidiary of Duke Energy Renewables Wind, LLC) (OCS-A 0546)
Distance to Closest Lease Area:	Approximately 150 nautical miles
Potential Offshore Wind Port Uses:	Staging, Assembly, Fabrication (HDR Engineering Inc. of the Carolinas [HDR Engineering] 2023)

Radio Island is an approximately 254-acre dredge spoils–created island located within the municipal limits of Morehead City, North Carolina, and is located between the mainland cities of Morehead City and Beaufort in Carteret County (HDR Engineering 2023). Radio Island is surrounded by the Intracoastal Waterway and has direct access to the ocean via a federally maintained navigation channel. The Port of Morehead City, located north and west of Radio Island, has a channel depth of 45 feet, and the ocean approach channel has a depth of 47 feet (HDR Engineering 2023). There are no air draft restrictions at Radio Island or between the island and the open ocean, which is approximately 4 miles south (HDR Engineering 2023).

Existing infrastructure on Radio Island includes a bulkhead, a 320-foot-long dock, administrative offices, and several aboveground storage tanks for liquid commodities that are currently empty (HDR Engineering 2023). Six additional, empty, aboveground storage tanks are located on the southern end of the island on port property (HDR Engineering 2023). The island also includes existing rail spurs, operated by the Carolina Coastal Railway, and U.S. Route 70 travels along the northern boundary of the island (HDR Engineering 2023).

The Port of Morehead City is classified as a “Strategic Seaport” by the U.S. Department of Defense (DOD); these are key facilities enabling rapid deployment of military forces by the DOD (HDR Engineering 2023). At the southern tip of Radio Island, the U.S. Navy owns and operates ramps and staging areas for troop and equipment embarking and debarking for nearby U.S. Marine bases (Camp Lejeune and Air Station Cherry Point) (HDR Engineering 2023).

The Port of Morehead City covers approximately 128 acres and has nine existing berths and a roll-on/roll-off (Ro/Ro) berth (North Carolina Ports 2021). The port has 43 acres of open storage area, 1 million square feet of covered warehouse space, and direct rail access (North Carolina Ports 2021). Similar to Radio Island, the Port of Morehead City has no air draft restrictions (North Carolina Ports 2021).

In February 2024, North Carolina State Ports Authority (NCSPA) finalized the decision to develop Radio Island into a multi-use terminal for automotive and offshore wind industries (NCSPA 2024). The site buildout concept includes construction of a 300,000-square-foot manufacturing plant, 100,000 square feet of warehouse space, additional rail spurs, and new berthing areas, as well as modifying the existing pier to accommodate Ro/Ro vessels (McGrath 2022).

Existing capabilities are summarized in Table 1-1.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Table 1-1. Existing Capabilities

Capability Area	Criteria (Units)	Value
Access	Port Access Channel Width (feet)	400 (North Carolina Ports 2021)
	Port Access Channel Controlling Depth (feet)	45 (North Carolina Ports 2021)
	Overhead / Air Draft Restriction (feet)	Unlimited (North Carolina Ports 2021)
	Number of Berths	None (NCSPA 2024)
Quayside	Bearing Capacity (metric tons [mt]/square meters [m ²])	Unknown (site not assessed) (Elkinton et al. 2014)
	Length (feet)	320 (dock only) (NCSPA 2024)
	Depth (feet)	45 (NCSPA 2024)
	Suitable for Spud-Jacking (Yes/No)	Unknown (site not assessed) (Elkinton et al. 2014)
Upland Storage	Approx. Size of Upland Storage/Staging Area (acres)	None existing (NCSPA 2024)
	Upland Storage/Staging Area Bearing Capacity (mt/m ²)	n/a
	Haul Route Area Bearing Capacity (mt/m ²)	n/a
	Approx. Size of Covered Storage Area (acres)	None existing (NCSPA 2024)
Roll-On/Roll-Off (Ro/Ro)	Ro/Ro Capability (Yes/No)	No (HDR Engineering 2023)
	Width of Ro/Ro Berth (feet)	n/a
	Ro/Ro Ramp and Berth Bearing Capacity (mt/m ²)	n/a
Cranes	Lifting Capacity (mt)	n/a
	Height Restrictions (Yes/No)	Unlimited (HDR Engineering 2023)
Transportation	On-Site Rail (Yes/No)	Yes (HDR Engineering 2023)
	On-Site Highway (Yes/No)	Highway adjacent to property (HDR Engineering 2023)

Note: n/a = not applicable.

Potential Future Port Modifications: This section provides a hypothetical port modification scenario based on the best publicly available information at the time this report was produced. The modification scenario is analyzed in later sections of the report to identify a general level of effort needed and the resulting potential environmental and socioeconomic effects to surrounding areas and communities. Existing plans that were used to formulate the buildout scenario are in various stages of development and may or may not come to fruition as specified herein.

The conceptual design for a proposed multi-use terminal is presented in NCSPA's 2024 *State Record of Decision: Radio Island Multi-Use Terminal, Morehead City, Carteret County* (ROD) and in HDR Engineering's 2023 *Draft Environmental Impact Statement: Radio Island Multi-Use Terminal, Morehead City, Carteret County* (DEIR). The multi-use terminal is expected to service the automotive and offshore wind (OSW) industries to enhance the state's economic development programs (HDR Engineering 2023).

Modifications proposed in the DEIR and ROD for building out the Radio Island multi-use terminal include dredging an access area and turning basin and construction of a 1,600-linear-foot berth; an approximately 60-acre storage and laydown area; an approximately 40-acre lot for Ro/Ro and automotive cargo; a Ro/Ro ramp and dock; a 100,000-square-foot warehouse and office space; a 300,000-square-foot fabrication and assembly building for OSW components; and new rail spurs, access roads, and parking lots (HDR Engineering 2023).

Modifications required to provide sufficient access to the proposed berth including dredging an area 18 to 28 acres in size between the proposed berth and the existing federally maintained navigation channel. The dredging would target a depth of 45 feet, consistent with the adjacent channel (NCSPA 2024). The estimated dredge volume is 900,000 cubic yards (NCSPA 2024). Although a specific dredging method and disposal site are not included in the conceptual design, consistent with concepts presented for Wilmington, North Carolina, it is assumed that dredging would be conducted using mechanical means and dredged material would be disposed of at an open ocean disposal site or would potentially be used on-site for fill and site grading. If disposal of the dredged material occurs at an offshore dump site, no dewatering or stabilization of the dredged material would be expected. If dredged material is used on-site for fill, it would require dewatering and stabilization, which could occur on-site using passive (e.g., geobags) or active (e.g., filter press) dewatering methods. No dredging is proposed for the area around the proposed

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Ro/Ro ramp; therefore, it is assumed that existing depths in that area are adequate for use to support large Ro/Ro vessels.

Modifications required to construct the quay for vessel berthing include the construction of a 1,600-foot by 150-foot-wide concrete relieving platform. The platform would be constructed by driving or drilling steel piles (estimated to require 1,298 piles [NCSPA 2024]) and constructing a steel rebar supported concrete deck. Based on similar proposed heavy lift quays (e.g., Wilmington North Property), the concrete deck may be as much as 4 feet thick. Based on the report by BVG Associates LLP (2021), it is assumed that the target ground bearing capacity for the quays would be up to 6,000 psf to support heavy-lift operations via use of mobile cranes.

Modifications required to construct or modify the existing T-head dock into a Ro/Ro ramp and dock would be similar to those required for the main quay, with the exception that ground bearing capacities do not need to account for mobile cranes or heavy-lift components. Steel piles would be driven or drilled (estimated to require 59 piles [NCSPA 2024]) in order to construct a steel rebar-supported concrete deck. The ramp would be connected to storage areas via new access and haul roads.

Modifications required to prepare the 60-acre OSW component storage area include clearing and grading of the existing site, potentially including using processed dredged material as fill. Following grading, a thick layer of dense graded aggregate (DGA) would be placed and compacted to increase the ground bearing capacity (NCSPA 2024). It is assumed that a layer up to 3 feet thick of DGA would be placed to achieve target ground bearing capacities of up to 4,000 psf, consistent with similar concepts (BVG Associates LLP 2021).

Similar to the OSW storage area, modifications required to prepare the 40-acre Ro/Ro storage area include clearing and grading of the existing site (potentially including using processed dredged material as fill), and paving (NCSPA 2024). Although not specifically mentioned, it is assumed that required ground bearing capacity in the Ro/Ro storage area would be less than that required for the OSW component storage area.

Modifications required to construct the approximately 100,000-square-foot covered warehouse and office building and the 300,000-square-foot fabrication and assembly building would include site clearing and grading, ground compaction to increase bearing capacities to targeted levels, and construction of a concrete pad for the structures. Each structure would have adjacent parking lots and access roads.

Modifications required to construct new rail spurs and roads include site clearing, grading, compaction, and either paving (for roads) or construction of rail beds and rail lines. Additional minor modifications expected for site development include the construction of security features (fencing and gates), lighting, and construction of stormwater collection and management systems.

As noted, there are no air draft restrictions at Radio Island or between the site and the open ocean (NCSPA 2024).

The primary impact driver during operation would be an increased operational tempo in the area, such as an increase in ships calling, an increase in local terrestrial cargo transportation, and associated worker activities. As noted, the site is currently not in use for commercial cargo operations, so development of a multi-use terminal will significantly increase impacts from ships calling, cargo management operations, and from the workforce.

2 Air Quality

This screening-level air quality assessment characterizes the existing air quality in Carteret County, calculates the magnitude of emissions that may arise due to the port modification, and estimates the area over which air quality issues may arise.

Existing Conditions: Carteret County, North Carolina, is primarily rural including low urban areas with a moderate population density and a moderate sizable industrial base. Emission sources within the boundaries of Carteret County, within the region, and within neighboring metropolitan areas affect the county's air quality. The Carteret County emission inventory data for 2020, calculated in U.S. tons per year (tpy), is presented in Table 2-1. Oxides of nitrogen (NO_x) emissions are primarily from on-road vehicles, with emissions from natural processes being the second-largest source. Volatile organic compounds (VOC) emissions are primarily from vegetation sources, and highway vehicles (EPA 2023). When sunlight is present, VOCs and NO_x react to form ground-level ozone, which is

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

a key component of smog. This makes these pollutants—especially NO_x—a significant concern for managing air quality.

Table 2-1. Emissions Inventory in Tons per Year for Carteret County

Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	VOC (tpy)	HAPs (tpy)	CO _{2e} (MTpy)
Agriculture	–	–	–	28	5	2	–	–
Biogenics*	1,098	166	–	–	–	8,141	825	–
Dust	–	–	–	544	72	–	–	–
Fires	6,252	93	50	650	544	1,468	240	73,848
Fuel Combustion	344	40	2	55	54	53	18	–
Industrial Processes§	–	–	–	–	–	11	1	–
Miscellaneous†	191	9	2	135	124	676	125	–
Mobile	15,292	1,896	6	94	64	2,026	616	530,256
Point-Sources	132	19	2	5	4	28	20	8,099
Total	23,039	2,223	62	1,511	867	12,405	1,845	612,203

Source: EPA (2023).

Note: CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; HAP = Hazardous Air Pollutant; NO_x = nitrogen oxides; PM = particulate matter; SO₂ = sulfur dioxide; VOC = volatile organic compound. MTpy = metric tons per year; the metric unit is used for CO_{2e} emissions by convention.

* Biogenics include those emissions derived from natural processes (such as vegetation and soil).

§ Industrial processes includes various Storage and Transfer facilities.

† Miscellaneous categories include bulk gasoline terminals, waste disposal, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

The General Conformity Rule was established under Section 176(c)(4) of the Clean Air Act and ensures that federal actions do not inhibit a state's attainment plans for areas designated as nonattainment or maintenance. The air quality in Carteret County meets the National Ambient Air Quality Standards (NAAQS) and is in attainment with respect to the criteria pollutants (EPA 2024a). Therefore, the General Conformity Rule is not applicable.

While Carteret County is in attainment with the NAAQS, ozone is a pollutant that has the potential to increase as population and land development in the area increases. The design value for O₃ is the annual fourth-highest daily maximum 8-hour ozone concentration averaged over three years. Ambient air quality monitors located in Carteret County reported an O₃ design value of 59.0 parts per billion (ppb) on average for the 2019 to 2021 period, 58.0 ppb on average for the 2020 to 2022 period, and 63.3 ppb on average for the 2021 to 2023 period (EPA 2024b).

Modification-Related Emissions: Air quality impacts arising from port modification activities and modification-related operations would be the direct result of emissions from vessels, vehicles, and port machinery, as well as fugitive dust from earth moving activities. During port modification activities, emissions would consist of both marine and land-based mobile sources. The primary marine emissions sources are anticipated to include a 520-kilowatt (kW) propulsion engine for dredge and support vessels such as tugboats, survey vessels, and crew boats. During construction, the primary land-based equipment would include nonroad vehicles such as bulldozers and excavators to place fill, as well as heavy-duty diesel-powered on-road vehicles to transport supplies and gasoline-powered light trucks for workers commuting to and from the construction site.

Screening-level emission estimates (Table 2-2) were calculated in tpy based on anticipated hours of operation, total days of operation, horsepower (HP) rating, assumed load factor, fuel type, and the following standard assumptions:

- Dredging would occur over 9 months.
- Use of ultra-low sulfur fuel in the mobile sources.
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was used for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 10 hours/day, 316 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 5% of the total surface area would be disturbed daily.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Table 2-2. Estimated Construction Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	54.97	105.28	0.22	4.28	2.69	2.61	–	21,865.23
Nonroad Emissions	25.03	67.53	0.09	4.74	4.01	3.89	2.30	28,855.40
On-Road Emissions	18.18	1.33	0.23	0.23	2.72	0.67	0.06	1,869.31
Fugitive Dust	–	–	–	–	29.23	2.93	–	–
Total	98.18	174.14	0.54	9.25	38.65	10.10	2.36	52,589.94

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Air emissions from dredging expansion would not likely add appreciably to existing emissions. However, port-specific air quality analyses and monitoring based on final designs and construction plans would likely be required to assess any localized air quality impacts resulting from construction activities.

Port modifications would result in long term changes in daily vessel trip numbers, vessel size/classes, and non-vessel emission sources during operations. Preliminary screening-level estimates of the change in emissions during operation (Table 2-3) were calculated based on anticipated hours of operation, occurrences of inspections and maintenance events, HP rating, assumed load factor, and fuel type and the following standard assumptions:

- Hours of operating equipment would be 8,760 hours/year (24 hours/day 365 days/year).
- Tier 2 engines for mobile and portable sources.
- A conversion of 0.746 kW/HP was for all engines.
- EPA MOVES3 was used to calculate nonroad and on-road mobile source emissions.
- Workdays of 24 hours/day, 365 days/year.
- All workers will be commuting to the worksite by driving their personal vehicles from their respective homes.
- 25% of gasoline vehicles were made before 2001 and 75% were made after.
- 50% of diesel vehicles were made before 2007 and 50% were made after.

Table 2-3. Estimated Operational Emission Totals

Emission Source	CO (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOC (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	HAPs (tpy)	CO ₂ e (MTpy)
Marine Emissions	0.57	0.51	<0.01	0.01	0.01	0.01	–	182.26
Nonroad Emissions	0.03	0.11	<0.01	0.01	<0.01	<0.01	<0.01	54.94
On-Road Emissions	0.18	0.01	<0.01	<0.01	0.03	0.01	<0.01	18.58
Inspections	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17
Total	0.78	11.52	<0.01	0.02	0.04	0.02	<0.01	255.95

Note: May not sum to total due to rounding. CO₂e = carbon dioxide equivalent; MTpy = metric tons per year.

Area of Potential Air Quality Issues: For screening level purposes only, a single AERSCREEN modeling run was performed on NO_x, the greatest pollutant of concern, and compared against the relevant Significant Impact Level to determine the geographical extent of the area over which air quality issues may arise.

Construction activities were assumed to be performed sequentially, with the dredging phase accounting for the maximum hourly NO_x emissions. The resulting estimated region of influence was 85.75 kilometers. While the airshed is currently in attainment or unclassified for all NAAQS pollutants, the estimated region of influence provides a conservative radius of potential impacts.

Overall, there is likely to be temporary, adverse, direct and indirect impacts on air quality in the region because of emissions from dredging during construction; however, the port modifications would also generate long-term beneficial direct and cumulative impacts due to reduced air emissions arising from future development and operation of renewable energy electricity generation.

Individual, port-specific air quality analyses and monitoring would be required to rigorously assess any localized air quality impacts resulting from proposed modifications.

3 Cultural Resources

Cultural resources that could be affected by the potential port modifications described above consist of aboveground and archaeological resources. In general, three cultural resource environments could be impacted: 1) ground surface or buried terrestrial archaeological sites, 2) shoreline, riverbed, seafloor, or sub-seafloor marine archaeological sites and Ancient Submerged Landforms, and 3) aboveground historic buildings, structures, or objects, typically 50 years of age or older. Any of these may be considered properties of traditional religious and cultural significance to federally recognized Native American tribes, the significance of which can only be determined through tribal consultation.

Terrestrial and marine archaeological sites could be adversely affected by impacts related to ground-disturbing or seafloor-disturbing activities (e.g., earth-moving, vegetation clearing, dredging, excavation, fill, pile driving, anchoring, or soil/sediment saturating spills). Aboveground historic buildings and structures could be physically impacted where changes (demolition, additions, or changes in use or materials) to the building, structure, or associated site features such as on-site facilities or landscaping occur during construction or operations and maintenance (O&M). These impacts could affect the integrity of setting, feeling, association, workmanship, materials, design, or location in a manner that diminishes the ability of the historic property to convey its historic significance. Archaeological sites and aboveground historic resources could also be adversely affected by non-physical (visual, auditory, or atmospheric) impacts resulting from construction or O&M that affect integrity in a manner that diminishes the ability of the historic property or properties to convey historic significance (such as blocked or altered ocean views, removal of historic features in the defined viewshed, addition of non-historic buildings or features, increased onshore and offshore port traffic visibility, or increased/changed nighttime lighting).

All conclusions regarding effects to previously known or newly identified historic properties and their eligibility for inclusion on the National Register of Historic Places (NRHP) would require consultation with and the concurrence of State Historic Preservation Officers and affected tribes. Should unknown terrestrial or marine archaeological resources be discovered during ground-disturbing activities, construction, or O&M, the activity should be halted, and the plan agreed upon within the applicable agreement document should be followed.

Identified Cultural Resources: The modification scenario area for Radio Island at the Port of Morehead is within Carteret County, North Carolina, situated within the Intercoastal Waterway, and along Onslow Bay and Bogue Sound, west of Cape Lookout. It is surrounded by multiple historic resources (National Park Service [NPS] 2024; North Carolina Historic Preservation Office [NCHPO] 2024). In-person review of the confidential NCHPO Historic Preservation Office database and publicly available reference sources identified few previously documented cultural resource inventory points consisting of archaeological sites and aboveground historic areas, buildings, structures, and objects within a 3-mile radius surrounding the modification scenario area (NCHPO 2024; NPS 2024). These inventory points consisted of archaeological sites and districts, as well as aboveground historic areas, buildings, and structures inventoried as cultural resources at the local, state, or federal review levels (NCHPO 2024; NPS 2024). Previous Bureau of Ocean Energy Management (BOEM) (2023) assessments suggest that a 3-mile radius for considering effects to cultural resources is reasonable for visual impacts from development of buildings and structure of similar height and prominence to those potentially being considered for port developments in this setting.

The modification scenario area is a 200-acre site on the west side of Radio Island within the Morehead City Channel of the Newport River and east of the Bogue Sound (NCSPA 2024). During the early eighteenth century, and throughout the twentieth century, the Cape Lookout region was a fishing, shipbuilding, and shipping hub. During the 1930s, Inlet Island, occupied historically by the U.S. Navy, was enlarged with sands dredged from the channel and sold by the U.S. Navy to private owners, who built a large radio transmission tower to support a regional radio station following World War II. Renamed as Radio Island, the island developed into a tourism destination and marine research center, along with the adjacent community of Beaufort to the east, in the mid-twentieth century. The 1947 radio station and tower were demolished in the early 1970s, and a boat dock and ramp complex were then developed on the east side of the island (Google Earth 2024; Morehead City 2024; NCHPO 2024). Based on recent aerial photographs, the area containing the modification scenario area encompasses the west side of Radio Island on the Morehead City Channel of the Newport River. This area faces the North Carolina Port on the Morehead City peninsula to the north and west, and Goat Island and Fort Macon State Park to the southwest. There are several

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

warehouses and storage buildings along Radio Island Road within the modification scenario area, as well as at least six storage tanks and several docks and barges along the west side (Google Earth 2024).

Route 70 is situated at the northern limit of Radio Island and the area to the south of the highway consists of boat yards, docks, storage facilities, condominiums, and single-family dwellings on Radio Island Road, Marine Road, and Morgan Road (Google Earth 2024). These structures appear from aerial imagery to be of mid- to late twentieth century or later construction. Approximately 154 acres of the modification scenario area are undeveloped (NCSPA 2024). Limited screening from vegetation or trees is available on the west side of the Radio Island modification scenario area (Google Earth 2024).

The Radio Island modification scenario area is east of the National Register Beaufort Historic District and west of the state-level Port of Morehead City Historic District, which was determined to be eligible as a National Register Historic District. It is situated to the north of Fort Macon, a nineteenth-century brick fort situated just over 1 mile to the south of the modification scenario area (NCHPO 2024; NPS 2024).

Terrestrial Archaeological Resources: Terrestrial archaeological resources, including Native American Pre-Contact, Contact, and Post-Contact period and Historic period archaeological sites, are known to occur within a 3-mile radius, with 20 sites identified in NCHPO's confidential site files database reviewed in person (NCHPO 2024). These archaeological resources include Pre-Contact camp sites and lithic scatters and Post-Contact structures, middens, cemeteries, and at least one named shipwreck (NCHPO 2024; NPS 2024). Three of these archaeological sites are NRHP-listed (NCHPO 2024).

Within a 1-mile radius, there are no NRHP-listed or NRHP-eligible archaeological sites (NCHPO 2024). However, older soils may persist in this area undisturbed by previous port, railway, or building construction or existing harbor developments.

Marine Archaeological Resources: One named shipwreck and three unnamed shipwrecks are located within a 3-mile radius (NCHPO 2024). There are also two submerged obstructions, each of unknown age and undetermined NRHP eligibility (National Oceanic and Atmospheric Administration [NOAA] 2024a; NCHPO 2024). One unnamed shipwreck is located within 1 mile, a possible Spanish vessel (ca. 1780–1850) determined ineligible for the NRHP (NCHPO 2024).

Aboveground Historic Resources: Within the 3-mile radius, more than 670 aboveground inventory points are listed in the NCHPO publicly available database (NCHPO 2024; NPS 2024). These inventory points consist of dwellings, houses of worship, landscape elements (paths, fences, parks), commercial or industrial buildings (mills, warehouses, foundries), and municipal facilities. Of these resources, six are listed on the NRHP and five are considered eligible. There are two National Register Historic Districts within the 3-mile radius (NCHPO 2024; NPS 2024).

Seven previously documented cultural resource inventory points are located within 1 mile of the modification scenario area (NCHPO 2024). These resources consist of aboveground historic areas, buildings, structures, or objects inventoried on local or state lists. Of these, none are individually listed or considered individually eligible for the NRHP (NCHPO 2024; NPS 2024). One state-level historic district is located within 1 mile, the Port of Morehead City Historic District, which is considered eligible to be a National Register Historic District. There is also one listed National Register Historic District, the Beaufort Historic District, which partially overlaps Radio Island on the eastern side of the 1-mile radius. This Historic District encompasses 16 contributing historic buildings or sites, but none are on Radio Island (NCHPO 2024; NPS 2024).

Cultural Resources Potential: Aerial imagery and historic topographic map review of the 1-mile radius indicates the presence of a low number of cultural resources and historic structures on Radio Island (Google Earth 2024). The majority of the buildings appear to be twentieth century or later (Google Earth 2024). Many of these historic areas, buildings, and structures are at the margins of the 1-mile radius and relate to the emergence of the Radio Island as an historic center for fishing, shipping, industry, tourism, and research during the eighteenth through twentieth centuries (NCHPO 2024; NPS 2024).

Unknown terrestrial archaeological sites are of low to moderate potential in the modification scenario area or surrounding areas, including due to the formation of Radio Island from dredge materials; however, could occur

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

adjacent in more deeply buried terrestrial, riverbank or channel deposits, or in undisturbed natural areas (intact riverbank and channel sediments). Post-Contact sites could occur at historical areas that have experienced redevelopment through time. Port modifications are likely to disturb sediment within terrestrial habitats or additional shoreline, riverbed, and channel sediments, some of which could have the capability of retaining buried archaeological sites. An unknown portion of the acreage around the modification scenario area represents previously disturbed soil at depths able to retain archaeological deposits.

Marine archaeological wrecks and obstructions were identified based on available sources (NOAA 2024a; NPS 2024). Other unknown marine archaeological sites could occur in riverbeds and channel sediments that are undisturbed by previous dredging, excavation, or erosion. Port modifications could affect riverbank and channel sediments that could be of potential to retain buried archaeological sites.

Multiple aboveground historic areas, buildings, and structures were identified within 1 mile and could be impacted physically by port modifications. Aboveground historic areas, buildings, and structures at distances over 1 mile but within 3 miles are not expected to be subject to physical impacts from the potential modifications.

This summary of potential impacts is based on evaluation of the sources cited and does not constitute a full record search to identify all known cultural resources within the study area. Any conclusions based on this summary are subject to further consultation with oversight agencies.

4 Ecological Resources

Depending on the site and surrounding area, ecological resources present and potentially impacted by port construction and operation could include habitats such as subtidal areas, shorelines, wetlands, or forests; designated ecological places such as essential fish habitat or biologically important areas; and aquatic or terrestrial species. Most impacts would occur during construction. Habitats and designated ecological places would generally be affected by activities that permanently or temporarily alter the environment such as earth-moving, vegetation clearing, dredging, and placement of fill or aggregate. Species would generally be directly impacted by construction- or operation-related interactions with equipment, noise (particularly high intensity noise such as pile driving), or light.

Figure 4-1 and Table 4-1 summarize existing conditions as they relate to habitats, designated places, and protected species that may be present within 3 miles of the modification scenario area. Table 4-2 summarizes potential effects of port modifications on different ecological resources.

Table 4-1. Existing Habitats and Designated Places

Resource Category	Existing Conditions
Land Use / Terrestrial and Wetland Habitats^{1,16,18}	• Situated on Radio Island, an island with mixed land use including existing industrialized and commercial areas, and natural lands and habitats. • According to the National Hydrography Dataset, approximately 14 acres of swamp/marsh, and 12 acres of pond/lake features occupy the modification scenario area. However, current aerial imagery suggests this may be reduced due to natural processes in the coastal environment. • The island is situated in Morehead City Harbor, with Morehead City Channel to the west, and Bulkhead and Beaufort channels to the west. • The Newport River and other tributaries drain into Morehead City Harbor from the north. • High- to low- density residential areas, isolated forested areas, wetland/marsh complexes, and barrier islands are mixed in the landscape within 3 miles.
Shoreline Habitats⁸	• Within the modification scenario area, sand beach is the predominant shoreline category. • Shoreline within 3 miles is a mix of natural types such as sand beach, tidal marsh, and vegetated bank, with various man-made and armored shorelines, bordering areas of residential and commercial development.
Submerged Marine Habitats^{9,10,11,14}	• Benthic substrate is mixed sand and gravel. • Submerged Aquatic Vegetation patch mapped within 3 miles to the west of modification scenario area.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Resource Category	Existing Conditions
Designated Habitats / Places ^{2,3,5,6,7,15,19}	• Essential fish habitat within 1 mile: Atlantic Mackerel, Squid and Butterfishes; Summer Flounder, Scup, Black Sea Bass; Bluefish; Northeast Skate Complex; Northeast Multispecies; Snapper Grouper. • Habitat Areas of Particular Concern for Summer Flounder, Penaeid Shrimp, Coastal Migratory Pelagics, Golden Crab, Sargassum within 3 miles. • Coastal Barrier Resource Area NC-04P is within 1 mile to the south. Coastal Barrier Resource Area L03AP is within 3 miles to the southeast. • Carrot Island – Bird Shoal Important Bird Area within 1 mile of modification scenario area; Cape Lookout National Seashore Important Bird Area within 3 miles of modification scenario area. • Proposed Critical Habitat for rufa red knot and green sea turtle within 1 mile, and loggerhead sea turtle within 3 miles of modification scenario area. • Piping Plover Critical Habitat found within 1 mile of modification scenario area. • Biologically important areas for cetaceans (Bottlenose Dolphin and North Atlantic right whale) found within 1 mile of modification scenario area. • North Atlantic Right Whale Seasonal Management Area within 3 miles.
ESA Listed Species ^{4,17}	• Northern long-eared bat and tricolored bat: forested habitat and flyways within 1 mile. • Roseate terns: coastal islands within 3 miles. • North Atlantic right whale and fin whales may occur within 3 miles. • Atlantic sturgeon may occur within 1 mile. • Green, Kemp's ridley, Leatherback, and loggerhead sea turtles may occur within 1 mile. • West Indian manatee may occur within 1 mile. • Eastern black rail: wetland habitat within 1 mile. • Piping plover: critical habitat within 1 mile. • Red cockaded woodpecker: forest habitat and flyways within 1 mile. • Rufa red knot may occur within 1 mile. • Rough-leaved loosestrife may occur within 1 mile. • Seabeach amaranth may occur within 1 mile.
Migratory Birds and Eagles ¹⁷	• Bald eagles, along with 44 species of migratory birds (some with state protections), have suitable habitat within 1 mile.
Marine Mammals ^{5,7}	• Atlantic bottlenose dolphins and harbor porpoises are likely present near the modification scenario area, in addition to Endangered Species Act (ESA)–protected species.
State Specific Resources ^{12,13}	• The modification scenario area is located within an area identified as a “Very High” quality Natural Area, and nearby barrier islands are identified as “Exceptional” quality. • Approximately 4,500 acres of state and local parks and protected lands, and an additional 30,000 acres of jointly managed national reserves within 3 miles.

Sources: ¹Multi-Resolution Land Characteristics Consortium 2021; ²National Audubon Society 2024; ³NOAA 2021; ⁴NOAA 2022a; ⁵NOAA 2023a; ⁶NOAA 2023b; ⁷NOAA 2023c; ⁸NOAA 2024b; ⁹North Carolina Division of Marine Fisheries (NCDMF) 2022; ¹⁰NCDMF 2023a; ¹¹NCDMF 2023b; ¹²North Carolina Natural Heritage Program (NCNHP) 2023; ¹³NCNHP 2024; ¹⁴The Nature Conservancy 2019; ¹⁵United States Fish and Wildlife Service (USFWS) 2023a; ¹⁶USFWS 2023b; ¹⁷USFWS 2024; ¹⁸U.S. Geological Survey (USGS) 2022; ¹⁹USGS 2024.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

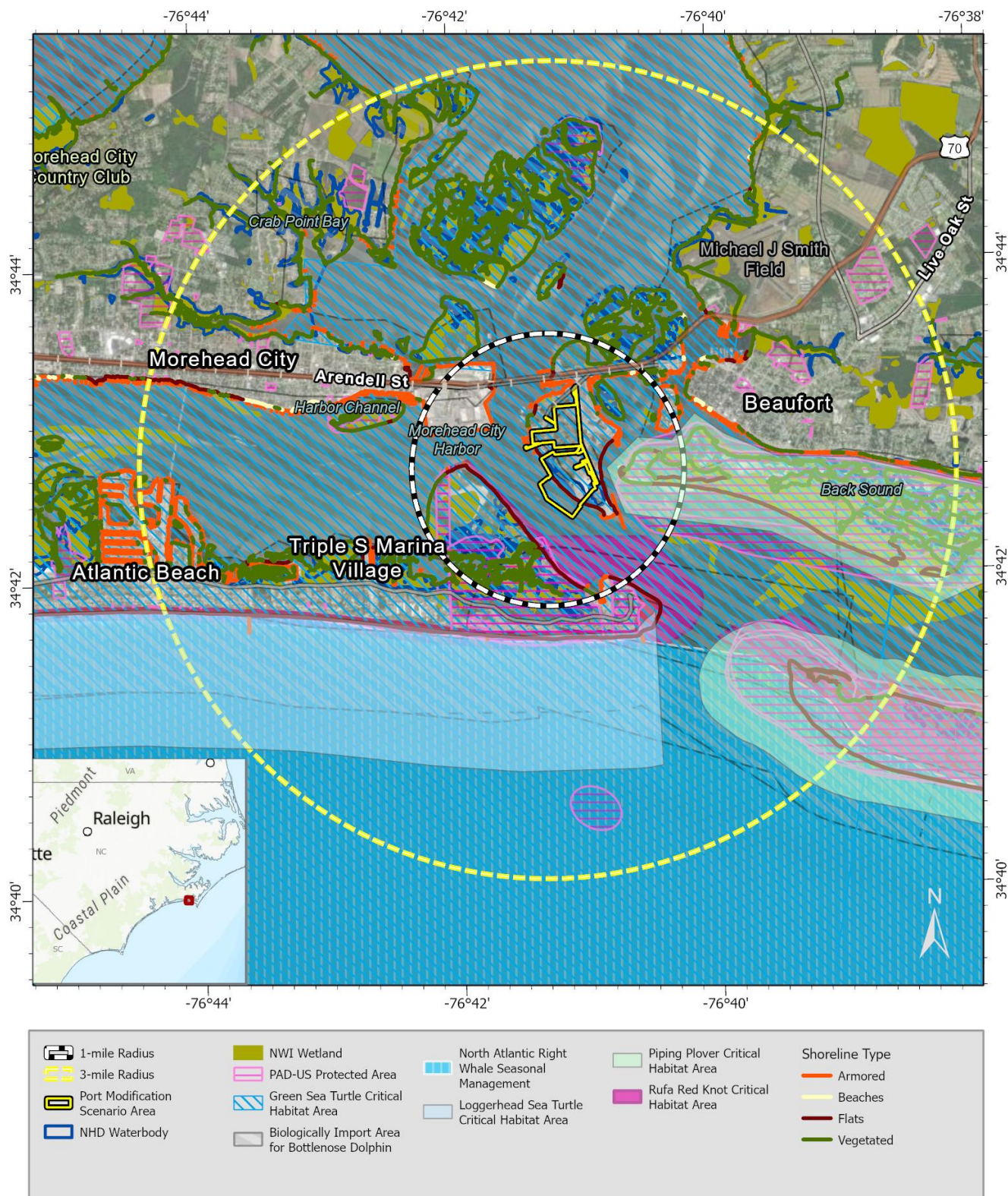


Figure 4-1. Existing habitats and natural resource areas.

Sources: NOAA 2023a, 2023b, 2023c, 2024c; USFWS 2023b; USGS 2022, 2024. Base map: Esri World Imagery.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Table 4-2. Potential Effects on Ecological Resources

Affected Resource	Primary Impact-Causing Elements	Potential Effects
Water Quality	Sediment suspension and deposition; dewatering	Sediment disturbance and temporary increase in turbidity for dredging, pile driving/drilling, and coffer dam dewatering associated with new berth construction.
Sediment Quality	None	No significant impacts to sediment quality anticipated.
Terrestrial Habitats	Terrestrial habitat alteration	Permanent loss of up to ~105 acres due to clearing for fill excavation, infrastructure/laydown areas, and roads. Terrestrial habitats may include ESA-listed plant species.
Onshore Aquatic Habitats	Aquatic habitat alteration	Permanent loss of up to ~26 acres of marsh and pond habitat (depending on field-verified existing conditions) for onshore infrastructure and access.
Shoreline	Habitat alteration	Permanent loss of sand beach shoreline within the modification scenario area; however, this beach shoreline type is fairly ubiquitous along the perimeter of the island.
Submerged Marine Habitats / Benthic Resources	Habitat alteration	Permanent loss of ~6 acres of benthic habitat and resources for new berth construction, and temporary loss of up to ~28 acres due to dredging.
Fish and Invertebrates	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species within range of acoustic disturbances and vessel interaction.
Marine Mammals	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts due to pile driving activities and construction vessel operation leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction.
Sea Turtles	Aquatic noise; vessel/equipment interaction	Temporary acoustic impacts from construction vessel operation and pile driving/drilling activities leading to temporary behavioral changes. Increased risk of injury or mortality due to vessel/equipment interaction. ESA-listed species and critical habitat within range of habitat alteration, acoustic disturbances and vessel interaction.
Birds and Bats	Terrestrial noise	ESA-listed species and critical habitat, along with bald eagles and some migratory birds with state protections, within 1 mile are at risk from temporary acoustic disturbances. Due to existing frequency of vessel traffic within the harbor, acoustic impacts during operations are expected to be similar.
Other Terrestrial Biota	Terrestrial noise	Impacts due to construction and operations noise may occur to state species of concern directly adjacent to the modification scenario area. Acoustic impacts during operations are expected to be similar to existing conditions due to the existing frequency of vessel traffic within the harbor.

Note: BMP = best management practice.

Potential effects were estimated using the publicly mapped and publicly available resource data that would be impacted by the footprint and activities for Potential Future Port Modifications described in Section 1, "Port Overview."

5 Socioeconomics

This screening-level socioeconomic assessment evaluates the potential effect of port modification on socioeconomic indicators such as population levels, demand for housing and temporary accommodations, demand for labor, income levels, community cohesion, government revenue, and demand for public services. Socioeconomic effects can be brought about directly by project spending or hiring, or indirectly if a) port modification affects area industries such as tourism and recreation, commercial shipping, or commercial fishing, or b) modification-related changes to air quality, views, noises, air quality, road traffic, maritime traffic, or recreational resources change human behavior or wellbeing. Impact-causing elements that create disturbances to everyday life (e.g., air emissions, noise, changes in visual resources, traffic) are generally considered within a 5-mile radius from the center of the port. Previous studies have shown impacts related to noise (Washington State Department of Transportation 2020), vehicle emissions (Choi et al. 2012), and altered views (Sullivan and Meyer 2014; Terrence J. DeWan & Associates Scenic Resources Consultants 2015) would generally dissipate within the 3-mile radius used in other sections of this profile; however, the impact radius for the socioeconomic assessment is expanded to 5 miles to account for additional movements of people and workers in and around the port. Additionally, impact-causing elements that work primarily through economic linkages are generally evaluated at the larger Micropolitan or Macropolitan Statistical Area (MSA) or at the county level.

Table 5-1 summarizes existing conditions and potential effects of the port modification scenario.

Pile driving–related noise during construction is noted as a particular impact-causing element of concern. The noise emitted by pile driving can be disruptive in both business and residential settings. A range of effective mitigating strategies for pile driving–related noise is available, including:

- Noise modeling should be used to determine whether pile driving would cause adverse effects.
- A range of pile driving technologies may be used, several of which materially reduce noise emissions.
- Sound barriers and shields can contain and absorb the noise.
- Time of day and day of week limitations on pile driving activities can limit noise-related impacts.

The influx of personal vehicles and cargo transportation can disrupt both local and regional traffic flows. Effective mitigating strategies to manage increased traffic include:

- Use traffic modeling to assess potential impacts on local and regional traffic flows and to determine the necessity and efficacy of mitigation measures.
- Encourage the use of carpooling, shuttle services, or public transportation for workers to reduce the number of personal vehicles.
- Implement scheduling for deliveries and construction activities to avoid peak traffic hours, thereby minimizing congestion.
- Develop comprehensive traffic management plans that include temporary traffic signals, designated construction vehicle routes, and clear signage to guide both workers and the public.
- Regularly monitor traffic conditions and adjust mitigation strategies as necessary to respond to real-time traffic patterns and congestion levels.

The addition of up to 200 workers during construction and 400 during operation could materially impact housing availability and put upward pressure on housing costs and rental rates in the months following the initiation of modification activities.

- Engage with local communities to address concerns related to housing and integrate community feedback into housing strategy planning to ensure the needs of both workers and local residents are considered.
- Depending on community feedback, the construction of housing facilities may need to be considered.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Table 5-1. Summary of Socioeconomic Existing Conditions, Impact-Causing Elements, and Potential Effects

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Land Use	The port development site on Radio Island is currently undeveloped, while the rest of the island is mixed natural, recreational, and commercial land with some industrial uses. Within 5 miles land use can be characterized as residential, commercial, recreational, and natural land (Esri 2023).	Approximately 130.9 acres will be permanently converted from mixed use (natural land and habitats/commercial) to developed area, including up to 22.8 acres for dredging operations and more than 95.6 acres for facilities and storage areas.	During construction, alteration of natural buffers may increase vulnerability to storm surges and flooding, with potential socioeconomic impacts on local communities due to increased erosion, altered drainage, and loss of natural resource availability. The buffering capabilities in unaltered surrounding areas, which feature similar land use, are likely to be sufficient to reduce socioeconomic impacts; however, this loss may increase the vulnerability of the port and other commercial operations on the island itself. No further changes to land use are anticipated after construction.
Infrastructure	Michael J. Smith Field is the nearest airport, less than 2 miles away. US 70 is the nearest highway. Other highways within 5 miles of the port include NC 58 and NC 24 (Esri 2023). Radio Island includes railway access to the west through Morehead City.	None; local infrastructure unaltered.	In the proposed port modification scenario, existing infrastructure would be unaltered.
Special Use Areas	There is one active military use area within 5 miles of the port: an active U.S. Navy staging area at the southern tip of Radio Island (ArcGIS Online 2020).	Increased maritime traffic.	Increased maritime traffic could interfere with Naval maritime activities to and from nearby U.S. Marine bases, but due to surrounding island access, significant interference is unlikely.
Visual	The port property and equipment are directly visible from nearby recreational areas but not generally visible from nearby residential and commercial areas due to intervening landscape (Google Maps 2024).	Cranes up to 300 feet tall during construction; lights and vessel activity during operation.	Activities and facilities would be near recreational areas. Port location and intervening landscapes reduce visibility from residential and commercial areas. Tall cranes may be widely visible. Operational lighting may be visible.
Noise	Noise levels are high within 5 miles of the port, ranging from 45 decibels to over 90 decibels. The highest noise is near the airport. Other sources are located along highways and rail corridors (U.S. Department of Transportation [USDOT] 2022).	General activity and pile driving noise during construction; increased port noise during operation.	Pile driving activity during construction could increase noise levels in areas around the port. General operational noise would reach the adjacent recreational areas and may reach nearby residential and commercial areas.
Air Quality	The EPA reports 0 of 5 air quality metrics within 5 miles of the port are above the 50th percentile nationally. Asthma risk is in the 33rd percentile nationally.	Emissions from project construction and operation.	The potential for degradation of local air quality has not been eliminated by preliminary screening. The project would support renewable energy and is likely to bring about a net reduction in global greenhouse gas (GHG) emissions.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Traffic (terrestrial)	The EPA reports traffic proximity within 5 miles of the port is in the 28th percentile nationally.	Project-related congestion.	For a port not currently developed for industrial operations, traffic from an additional 100–200 workers during construction and up to 400 during operation, as well as increased cargo transportation during both phases, could have a material impact on traffic on Radio Island and nearby access roads.
Maritime Navigation	The nearest marine highways include the Atlantic Deep Water Spine (USDOT 2018).	Increased maritime traffic.	During construction, there will be a material increase in port calls on Radio Island relative to existing conditions since the modification scenario area is currently not developed for industrial operations. The impact during operation would be contingent upon the number of projects that utilize the port.
Commercial Shipping	The modification scenario area is currently undeveloped. Adjacent port activity features tourist and recreation areas and a public boat launch and marina (Google Maps 2024).	Increased maritime traffic; displacement of existing onshore commercial facilities not anticipated.	Radio Island is currently not a commercial shipping port. Additional vessel traffic in the area would be required during construction and operation. For commercial shipping coming in and out of Morehead City, the sector has the ability to mitigate any potential maritime congestion issues during operations by shifting timing and location of port calls over the long run.
Commercial Fishing	Morehead City is not a top U.S. commercial fishing port (NOAA 2022b). Engagement score: medium-high (NOAA 2020). Reliance score: low (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	Modification scenario area does not overlap with commercial fishing ports/harbors. Material impacts to commercially fished stocks not anticipated.
Recreational Fishing	There are several deep-sea fishing charters in and out of Morehead City. There are numerous onshore recreational fishing locations within 1 mile of the modification scenario area, including on Radio Island. Engagement score: high (NOAA 2020). Reliance score: high (NOAA 2020).	Displacement of existing onshore harbor facilities and adverse impacts to stocks.	There is significant recreational activity within 1 mile of the port, with high recreational fishing engagement and reliance (NOAA 2020). The site is currently not in use for commercial cargo operations, and the increase in ships calling may materially impact recreational fishing activity from this baseline. Noise and physical disturbances are likely to temporarily affect fish behavior and availability, impacting the quality of recreational fishing experiences.
Recreational Resources	There are parks/protected areas, including a National Seashore, conservation and municipal park land, and federal marine protected areas, within 5 miles of the port. Beaches are located north of the port and south of the airport (Google Maps 2024; USGS 2024).	Air and noise emissions, visual alterations, terrestrial traffic.	Air and noise emissions during construction and operation may reach nearby recreational areas and boaters. Tall cranes would be visible from recreational areas. Increased port traffic could intermittently disrupt ferry and tour services, potentially affecting access to recreational resources that depend on ferry connectivity.
Tourism	3,696 persons (12.3% of employed persons) within the county are employed in “arts, entertainment, recreation, accommodations, and food services” (U.S. Census Bureau [USCB] 2023a).	Air and noise emissions, visual alterations, terrestrial traffic.	Potential degradation of view and soundscapes during construction and operation. The modifications may interfere with the operations of the adjacent maritime activities, potentially impacting ferry and cruise ship schedules and accessibility, thus affecting tourist experiences.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Topic	Existing Conditions	Impact-Causing Elements	Potential Effects
Housing and Lodging	161 of the 20,682 vacant housing units are available for rent within the county. Numerous hotels/motels and campgrounds are also available (USCB 2023b).	In-migration of project workers.	An influx of up to 200 workers during construction and 400 during operation may materially impact availability of housing resources in a county with 161 units available for rent.
Population	The population is 18,591 within 5 miles of the port and is relatively low density. The population of Carteret County is 68,353 (USCB 2023c).	Potential in-migration associated with employment opportunities.	The addition of up to 200 workers during construction and 400 during operation would not materially increase Carteret County's population.
Labor Force and Employment	The civilian labor force of Carteret County is 31,566 and employment is 30,029. The unemployment rate is 4.9% (USCB 2023a).	Demand for workers during construction and operation puts upward pressure on wages and downward pressure on unemployment.	The creation of up to 200 jobs during construction and 400 during operation in a 31,566-person labor force with 4.9% unemployment could be material.
Income Levels	The per-capita income in Carteret County is \$39,817 (USCB 2023a).	Increased labor demand puts upward pressure on wages.	The creation of up to 200 jobs during construction and 400 during operation at prevailing wages in a 31,566-person labor force with 4.9% unemployment is unlikely to result in a measurable increase in income levels.
Community Cohesion	The county containing the modification scenario area (Carteret County) ranks in the 50th percentile on the national Community Cohesion Index, as reported by Chetty et al. (2022). The three adjacent counties show below-median cohesion, with Community Cohesion Index percentiles of 2, 30, and 44, respectively.	Infrastructure that separates communities physically or socially. Divergent opinions related to offshore wind.	New infrastructure will not displace or geographically divide communities. Differences of opinion related to offshore wind may be exacerbated by modification-related activity.
Government Revenues	The 2022 total revenue for North Carolina was \$3.9 billion (USCB 2024).	Increased income and sales tax revenue.	Modification-related taxes would be substantial but not materially alter revenue at the state level.
Public Services	The EPA reports one hospital and six schools are within 5 miles of the port. 20.5% of the county population is employed in "educational, health care, and social services (USCB 2023a).	In-migration of project workers. Increased risk of large-scale industrial accident.	Changes to population levels would be small, as would the change in risk related to large-scale industrial accidents. Thus, demand for public services should not change materially.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

6 References

- ArcGIS Online. 2020. Military Installations, Ranges, and Training Areas [MIRTA] [dataset]. [updated 20 November 2023; accessed 11 May 2024]. <https://www.arcgis.com/home/item.html?id=fc0f38c5a19a46dbacd92f2fb823ef8c>.
- [BOEM] Bureau of Ocean Energy Management. 2023. *Revolution Wind Farm and Revolution Wind Export Cable Project Final Environmental Impact Statement*. OCS EIS/EA BOEM-2023-0038. U.S. Department of the Interior, Bureau of Ocean Energy Management Office of Renewable Energy Programs. [accessed 3 May 2024]. https://www.boem.gov/sites/default/files/documents/renewable-energy/state-activities/Revolution_Wind_FEIS_Vol1-and-2.pdf.
- BVG Associates LLP. 2021. Building North Carolina's Offshore Wind Supply Chain. March. [accessed August 2024]. <https://www.commerce.nc.gov/report-building-north-carolinas-offshore-wind-supply-chain/download?attachment>.
- Chetty R, Jackson MO, Kuchler T, Stroebel J, Hendren N, Fluegge RB, Gong S, et al. 2022. Social capital I: measurement and associations with economic mobility. *Nature* 608(7921):108–121. <https://doi.org/10.1038/s41586-022-04996-4>.
- Choi W, He M, Barbesant V, Kozawa K, Mara S, Winer A, Paulson S. 2012. Prevalence of wide area impacts downwind of freeways under pre-sunrise stable atmospheric conditions. *Atmospheric Environment* 2012 (62):318–327. doi: 10.1016/j.atmosenv.2012.07.084.
- Elkinton C, Blatiak A, Ameen H. 2014. Assessment of Ports for Offshore Wind Development in the United States. Document no. 700694-USPO-R-03. U.S. Department of Energy. San Diego (CA): Garrad Hassan America, Inc. [accessed 23 September 2024]. https://www.energy.gov/sites/prod/files/2014/04/f14/wind_offshore_port_readiness.pdf.
- [EPA] U.S. Environmental Protection Agency. 2023. 2020 National Emissions Inventory (NEI) Data. [published 31 March 2023; accessed 11 May 2024]. <https://www.epa.gov/air-emissions-inventories/2020-national-emissions-inventory-nei-data>.
- [EPA] U.S. Environmental Protection Agency. 2024a. Green Book – North Carolina Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. [updated 31 March 2024; accessed 10 May 2024]. https://www3.epa.gov/airquality/greenbook/anayo_nc.html.
- [EPA] U.S. Environmental Protection Agency. 2024b. AirData Air Quality Monitors [mapping app]. Outdoor Air Quality Data – Interactive Map of Air Quality Monitors. [accessed 11 May 2024]. <https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors>.
- Esri. 2023. Sentinel-2 10-Meter Land Use/Land Cover [map database]. 2017–2023. [accessed 11 May 2024]. <https://livingatlas.arcgis.com/landcover/>.
- Google Earth. 2024. Google Earth Pro [mapping application]. [accessed 12 May 2024]. <https://www.google.com/earth/about/versions/#earth-pro>.
- Google Maps. 2024. 34°42'40.79"N, 76°41'16.83"W. Street View. [accessed 9 May 2024].
- [HDR Engineering] HDR Engineering Inc. of the Carolinas. 2023. *Draft Environmental Impact Statement: Radio Island Multi-Use Terminal, Morehead City, Carteret County*. October. [accessed September 2024]. https://ncports.com/wp-content/uploads/2023/10/NC-State-Ports-Authority_Radio-Island-Draft-EIS_2023_10_03.pdf.
- McGrath G. 2022. NC Ports Proposes Morehead City Site as Hub for Offshore Wind Industry. *StarNews Online* 28 April 28. [accessed September 2024]. <https://www.starnewsonline.com/story/news/2022/04/28/morehead-city-proposed-offshore-wind-manufacturing-hub/7439460001/>.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

Morehead City Visitor's Guide. 2024. Radio Island. [accessed 27 September 2024].

<https://www.morehead.com/radio-island.html#:~:text=Essentially%2C%20the%20island%20was%20created,was%20sold%20to%20private%20investors.>

Multi-Resolution Land Characteristics Consortium. 2021. National Land Cover Database 2019 - Landcover and Imperviousness [NLCD]. [accessed 4 May 2024]. <https://www.mrlc.gov/data>.

National Audubon Society. 2024. Important Bird Areas. [accessed 4 May 2024].

<https://www.audubon.org/important-bird-areas>.

[NCDMF] North Carolina Division of Marine Fisheries. 2022. Submerged Aquatic Vegetation (SAV) 2019-2020 Mapping. [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/ncdenr::submerged-aquatic-vegetation-sav-2019-2020-mapping/about>.

[NCDMF] North Carolina Division of Marine Fisheries. 2023a. Estuarine Benthic Habitat Mapping Areas (Iteration 1). [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/nconemap::estuarine-benthic-habitat-mapping-areas-iteration-2/about>.

[NCDMF] North Carolina Division of Marine Fisheries. 2023b. Estuarine Benthic Habitat Mapping Areas (Iteration 2). [accessed 10 May 2024]. <https://www.nconemap.gov/datasets/nconemap::estuarine-benthic-habitat-mapping-areas-iteration-2/about>.

[NCHPO] North Carolina Historic Preservation Office. 2024. Historic Preservation Office Web 2.0 database. [accessed 27 September 2024].

<https://nc.maps.arcgis.com/home/item.html?id=d2d04d8d7e03403f889419526e682529https://nc.maps.arcgis.com/apps/webappviewer/index.html?id=d2d04d8d7e03403f889419526e682529>.

[NCNHP] North Carolina Natural Heritage Program. 2023. Biodiversity and Wildlife Habitat Assessment. [accessed 10 May 2024]. <https://www.nconemap.gov/maps/1c489a78c56c4d84bffe558cc570e6/about>.

[NCNHP] North Carolina Natural Heritage Program. 2024. NHP Natural Areas. [accessed 10 May 2024].

<https://www.nconemap.gov/maps/NC::north-carolina-natural-heritage-program-natural-areas/about>.

[NCSPA] North Carolina State Ports Authority. 2024. *State Record of Decision: Radio Island Multi-Use Terminal, Morehead City, Carteret County*. February. [accessed September 2024]. https://ncports.com/wp-content/uploads/2024/03/NCSPA_Radio-Island_ROD_20240228.pdf.

[NOAA] National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries Community Social Vulnerability Indicators (CSVIs). Version 4. NOAA Fisheries Office of Science and Technology. [updated 20 September 2023; accessed 11 May 2024]. <https://www.fisheries.noaa.gov/national/socioeconomics/social-indicators-fishing-communities-0>.

[NOAA] National Oceanic and Atmospheric Administration. 2021. Essential Fish Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 July 2021; accessed 4 May 2024].

<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022a. The Greater Atlantic Region ESA Section 7 Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 22 June 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2022b. Top US Ports [database]. Release 3.15.8.1. NOAA Fisheries Office of Science and Technology. [accessed 2 May 2024].

<https://www.fisheries.noaa.gov/foss/f?p=215:11:30250705344>.

[NOAA] National Oceanic and Atmospheric Administration. 2023a. North Atlantic Right Whale Seasonal Management Areas (SMA). NOAA Fisheries Office of Protected Resources. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/north-atlantic-right-whale-seasonal-management-areas-sma>.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

[NOAA] National Oceanic and Atmospheric Administration. 2023b. National ESA Critical Habitat Mapper [mapping app]. NOAA Fisheries Office of Protected Resources. [updated 16 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper>.

[NOAA] National Oceanic and Atmospheric Administration. 2023c. Biologically Important Areas for Cetaceans within U.S. Waters 2015-03-01 – Present [dataset]. NOAA Fisheries Office of Science and Technology. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/23643>.

[NOAA] National Oceanic and Atmospheric Administration. 2024a. Wrecks and Obstructions Database. Office of Coast Survey's Automated Wreck and Obstruction Information System [AWOIS]. [accessed 12 May 2024]. <https://www.nauticalcharts.noaa.gov/data/wrecks-and-obstructions.html>.

[NOAA] National Oceanic and Atmospheric Administration. 2024b. North Carolina 2016 ESIL (ESI Shoreline Types - Lines) [dataset]. NOAA Fisheries Office of Response and Restoration. [updated 17 October 2023; accessed 4 May 2024]. <https://www.fisheries.noaa.gov/inport/item/51695>.

[NOAA] National Oceanic and Atmospheric Administration. 2024c. National Environmental Sensitivity Index Shoreline: Gulf/Atlantic ESI, Pacific ESI: ESIL from 2010-06-15 to 2010-08-15 [dataset]. NOAA Fisheries Office of Response and Restoration. [accessed 11 Nov 2024]. <https://www.fisheries.noaa.gov/inport/item/69925>.

North Carolina Ports. 2021. Facilities Guide. October. [accessed September 2024]. https://ncports.com/wp-content/uploads/2021/10/Facilities_Guide_5.0_Oct.2021.pdf.

[NPS] National Park Service. 2024. National Register of Historic Places – National Register Database and Research [database]. [updated 17 January 2024; accessed 12 May 2024]. <https://www.nps.gov/subjects/nationalregister/database-research.htm>.

Sullivan R, Meyer M. 2014. Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects. Natural Resource Report NPS/ARD/NRR—2014/836. Fort Collins (CO): U.S. Department of the Interior, National Park Service, Natural Resources Stewardship and Science. [accessed 18 Dec 2024]. https://blmwyomingvisual.anl.gov/docs/NRR_VIAGuide-RenewableEnergy_2014-08-08_large.pdf.

Terrence J. DeWan & Associates Scenic Resources Consultants. 2015. *Northern Pass Transmission Line Visual Impact Assessment*. Prepared for Eversource Energy. Berlin (CT): Terrence J. DeWan & Associates Scenic Resources Consultants. [accessed 18 Dec 2024]. https://www.nhsec.nh.gov/projects/2015-06/application/Volume-XV/2015-06_2015-10-19_nptllc_psnh_app_17_visual_impact_assessment.pdf.

[TNC] The Nature Conservancy. 2019. Artificial Reefs Data, 2023 update by MARCO Ocean Data Portal. [accessed 4 May 2024]. https://portal.midatlanticocean.org/static/data_manager/metadata/html/ArtificialReefs_2023Feb_Update.htm.

[USCB] U.S. Census Bureau. 2023a. American Community Survey 5-Year Estimates Ending 2022, Table DP03: Selected Economic Characteristics [accessed May 2024]. <https://data.census.gov/table/ACSDP5Y2023.DP03?g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023b. American Community Survey 5-Year Estimates Ending 2022, Table B25004: Vacancy Status. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B25004?q=B25004:VACANCYSTATUS&g=310XX00US39300>.

[USCB] U.S. Census Bureau. 2023c. American Community Survey 5-Year Estimates Ending 2022, Table B01003: Total Population. [accessed May 2024]. <https://data.census.gov/table/ACSDT5Y2022.B01003?q=B01003:%20Total%20Population&g=310XX00US39300>.

[USDOT] U.S. Department of Transportation. 2018. Marine Highways [dataset]. [updated 9 November 2023; accessed 11 May 2024]. <https://hub.arcgis.com/datasets/usdot::marine-highways/about>.

[USDOT] U.S. Department of Transportation. 2022. National Transportation Noise in the U.S. for 2016, 2018 and 2020 [map]. [accessed 11 May 2024]. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/>.

MOREHEAD CITY

Radio Island at the Port of Morehead City, North Carolina – 34°42'40.79"N, 76°41'16.83"W

[USDOT] U.S. Department of Transportation. 2024. Port Profiles 2024. Bureau of Transportation Statistics. [accessed 11 May 2024]. <https://explore.dot.gov/views/PortProfiles2024/HomeDashboard?%3Aembed=y>.

[USFWS] U.S. Fish and Wildlife Service. 2023a. Coastal Barrier Resources System Mapper (version 2) [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [updated 16 August 2023; accessed 4 May 2024]. <https://fwprimary.wim.usgs.gov/CBRSMapper-v2/>.

[USFWS] U.S. Fish and Wildlife Service. 2023b. National Wetlands Inventory [mapping app]. U.S. Department of the Interior, Fish and Wildlife Service. [accessed 4 May 2024]. <https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper>.

[USFWS] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation (IPaC) tool. [accessed 4 May 2024]. <https://ipac.ecosphere.fws.gov/>.

[USGS] U.S. Geological Survey. 2022. National Hydrography Dataset High Resolution (NHDPlus_HR). [accessed 4 May 2024]. <https://www.usgs.gov/national-hydrography/access-national-hydrography-products>.

[USGS] U.S. Geological Survey. 2024. Protected Areas Database of the United States (PAD-US) 4: U.S. Gap Analysis Project [GAP]. [accessed 5 May 2024]. <https://doi.org/10.5066/P96WBCHS>.

Washington State Department of Transportation. 2020. Chapter 7.0: Construction Noise Impact Assessment. *Biological Assessment Preparation Advanced Training Manual Version 02-2012, Part 2 Guidance on Specific BA Topics*. [accessed 18 Dec 2024]. <https://www.nrc.gov/docs/ML1225/ML12250A723.pdf>.



U.S. Department of the Interior (DOI)

DOI protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.



Bureau of Ocean Energy Management (BOEM)

BOEM's mission is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM Environmental Studies Program

The mission of the Environmental Studies Program is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments. The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).