

Attachment 3

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Maryland Offshore Wind Final Environmental Impact Statement

Volume 1



BOEM
Bureau of Ocean Energy
Management

COVER SHEET

Maryland Offshore Wind Project Environmental Impact Statement

Draft () Final (X)

Type of Action: Administrative (x) Legislative ()

Area: Area of Renewable Energy Lease Number OCS-A 0490

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ABSTRACT

This Final Environmental Impact Statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction and installation, operations and maintenance, and conceptual decommissioning of the Maryland Offshore Wind Project (Project) proposed by US Wind Inc. (US Wind), in its Construction and Operations Plan (COP). The proposed Project described in the COP and this Final EIS would have a capacity of up to 2,200 megawatts (MW) and would be sited offshore Maryland, within Commercial Lease OCS-A 0490 (Lease Area). The Project is designed to serve demand for renewable energy in the Delmarva Peninsula, including Maryland.

This Final EIS was prepared in accordance with the requirements of the National Environmental Policy Act (42 United States Code 4321 et seq.) and implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508). This Final EIS will inform the Bureau of Ocean Energy Management in deciding whether to approve, approve with modifications, or disapprove the COP (30 CFR 585.628). The reorganization of the Renewable Energy rules (30 CFR Parts 285, 585, and 586) enacted on January 31, 2023, reassigned existing regulations governing safety and environmental oversight and enforcement of OCS renewable energy activities from BOEM to Bureau of Safety and Environmental Enforcement (BSEE).

Additional copies of this Final Environmental Impact Statement may be obtained by writing the Bureau of Ocean Energy Management (address above); by contacting Lorena Edenfield via telephone at (907) 231-7679; or by downloading from the BOEM website at <https://www.boem.gov/renewable-energy/state-activities/us-wind>.

Executive Summary

ES.1 Introduction

This Final Environmental Impact Statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and conceptual decommissioning of the Maryland Offshore Wind Project (Project) proposed by US Wind Inc. (US Wind), in its Construction and Operations Plan (COP). The Bureau of Ocean Energy Management (BOEM) has prepared this Final EIS under the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] 4321–4370f) and its implementing regulations. This Final EIS will inform BOEM’s decision on whether to approve, approve with modifications, or disapprove the COP (30 Code of Federal Regulations [CFR] 585.628).

Cooperating agencies may rely on this Final EIS to support their decision-making. In conjunction with submitting its COP, US Wind applied to the National Oceanic and Atmospheric Administration’s (NOAA’s) National Marine Fisheries Service (NMFS) for an incidental take authorization in the form of a Letter of Authorization (LOA) for Incidental Take Regulations under the Marine Mammal Protection Act (MMPA) of 1972, as amended (16 U.S.C. 1361 et seq.), for incidental take of marine mammals during Project construction. Under the MMPA, NMFS is required to review applications and, if appropriate, issue an incidental take authorization. NMFS intends to adopt the Final EIS if, after independent review and analysis, NMFS determines the Final EIS to be sufficient to support its separate proposed action and decision to issue the authorization, if appropriate. The U.S. Army Corps of Engineers (USACE) similarly intends to adopt the Final EIS to meet its responsibilities under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act of 1899 (RHA).

ES.2 Purpose and Need for the Proposed Action

In Executive Order (EO) 14008, *“Tackling the Climate Crisis at Home and Abroad,”* issued January 27, 2021, President Joseph R. Biden stated that it is the policy of the United States (U.S.): “to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure.”

Through a competitive leasing process under 30 CFR 585.211, BOEM awarded US Wind with Renewable Energy Lease Number OCS-A 0490 in 2014. During the same competitive lease sale, BOEM also awarded US Wind with Renewable Energy Lease Number OCS-A 0489. By a lease amendment, made effective March 1, 2018, OCS-A 0489 and OCS-A 0490 were merged into a single lease, Renewable Energy Lease Number OCS-A 0490. Renewable Energy Lease Number OCS-A 0489 automatically terminated. Under

the terms of the lease, US Wind has the exclusive right to submit a COP for activities within the Lease Area. US Wind submitted a COP to BOEM proposing the construction, installation, operation, and conceptual decommissioning of an offshore wind energy facility in the Lease Area (the Project).

US Wind's goal is to develop a commercial-scale, offshore wind energy project in the Lease Area. The Project (full build-out) comprises as many as 121 wind turbine generators (WTGs), up to 4 offshore substations (OSSs), up to 4 offshore export cables, and 1 meteorological tower (Met Tower), distributed across the Lease Area. The offshore export cables are planned to make landfall in Sussex County, Delaware. The Project will be interconnected to the onshore electric grid by up to four new 230 - 275 kilovolt (kV) export cables to new US Wind onshore substations, with an anticipated connection to the existing Indian River substation near Millsboro, Delaware (Figure ES-1).

Based on (1) BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, and EO 14008, (2) the goals of the Administration to deploy 30 gigawatts (GW) of offshore wind energy capacity in the U.S. by 2030, while protecting biodiversity and promoting ocean co-use,¹ and (3) in consideration of the goals of US Wind, the purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove US Wind's COP. BOEM will make this determination after weighing the factors in subsection 8(p)(4) of OCSLA that are applicable to plan decisions and in consideration of the above goals. BOEM's action is needed to fulfill its duties under the lease, which requires BOEM to make a decision on the lessee's plan to construct and operate a commercial-scale, offshore wind energy facility in the Lease Area.

In addition, NOAA's NMFS anticipates one or more requests for authorization under the MMPA to take marine mammals incidental to construction activities related to the Project. NMFS's issuance of an MMPA incidental take authorization would be a major federal action connected to BOEM's action (40 CFR 1501.9(e)(1)).² The purpose of the NMFS action—which is a direct outcome of US Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate US Wind's request pursuant to specific requirements of the MMPA and its implementing regulations administered by NMFS, consider impacts of US Wind's activities on relevant resources, and, if appropriate, issue the permit or authorization. NMFS must render a decision regarding the request for authorization as part of the agency's responsibilities under the MMPA (16 U.S.C. 1371(a)(5)(A)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's EIS to support that decision and fulfill its NEPA requirements.

¹ FACT SHEET: Biden Administration Jump starts Offshore Wind Energy Projects to Create Jobs, Interior, Energy, Commerce, and Transportation Departments Announce New Leasing, Funding, and Development Goals to Accelerate and Deploy Offshore Wind Energy and Jobs, The White House, [Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs](#).

² Under the MMPA, a "take" means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C. 1362).

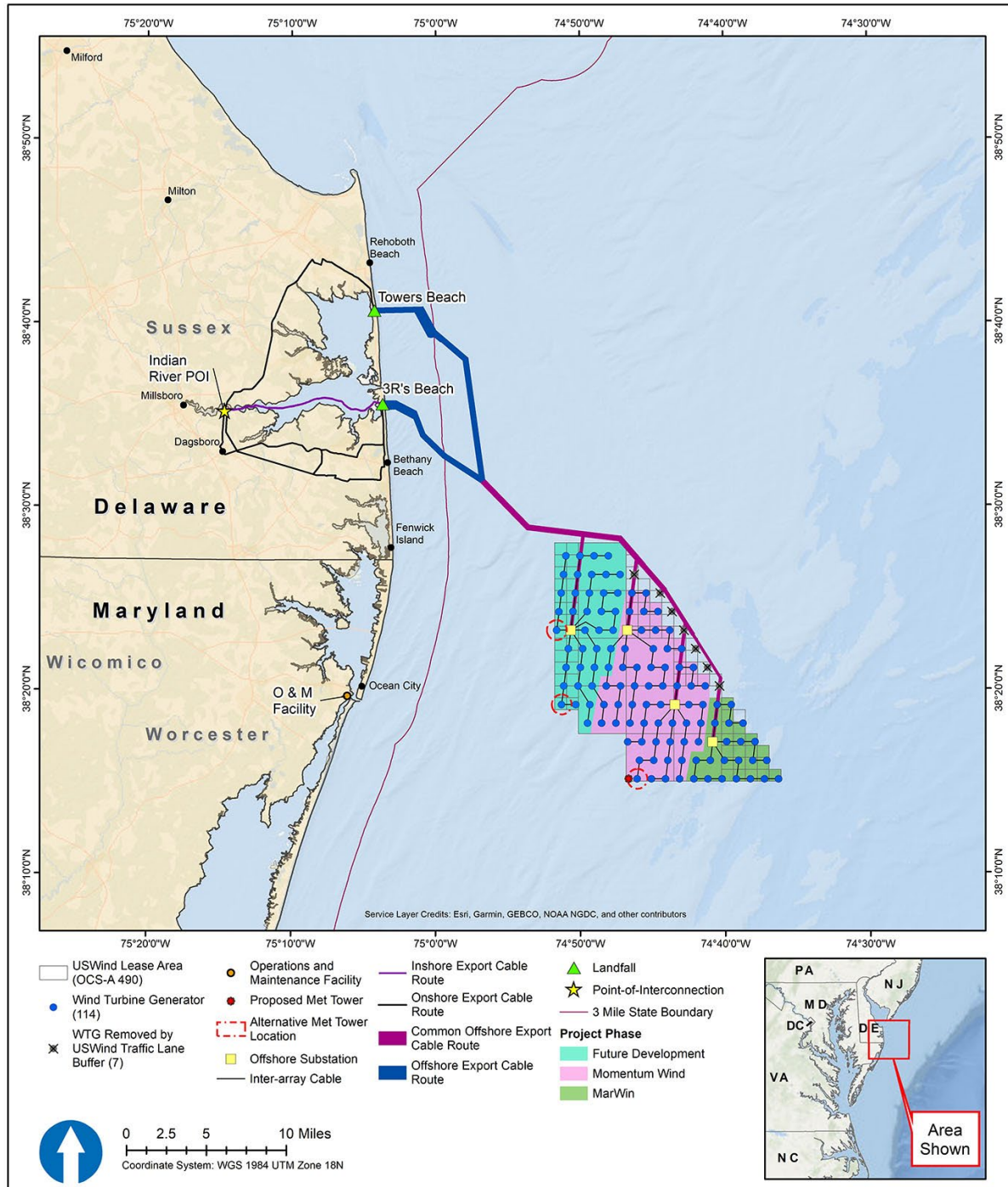


Figure ES-1. Maryland offshore wind Project area

The USACE Baltimore District anticipates requests for authorization of a permit action to be undertaken through authority delegated to the district engineer by 33 CFR 325.8, under Section 10 of the RHA (33 U.S.C. 403) and Section 404 of the CWA (33 U.S.C. 1344). In addition, it is anticipated that a Section 408 permission will be required pursuant to Section 14 of the RHA (33 U.S.C. 408) for any proposed alterations that could alter, occupy, or use any federally authorized civil works projects.

The USACE considers issuance of permits/ permissions under these three delegated authorities a major federal action connected to BOEM's action (40 CFR 1501.9(e)(1)). The need for the Project, as provided in the COP (Volume I, Section 1.1.2; US Wind 2024) and reviewed by the USACE for NEPA purposes, is to provide a commercially viable offshore wind energy project within the Lease Area to help the State of Maryland achieve its renewable energy goals. The basic Project purpose, as determined by the USACE for Section 404(b)(1) guidelines evaluation, is offshore wind energy generation. The overall Project purpose for Section 404(b)(1) guidelines evaluation, as determined by the USACE, is the construction and operation of a commercial-scale, offshore wind energy project for renewable energy generation in Lease Area OCS-A 0490 offshore Maryland and transmission/distribution to the PJM energy grid.

The purpose of USACE Section 408 action, as determined by Engineer Circular 1165-2-220, is to evaluate US Wind's request and determine whether the proposed alterations are injurious to the public interest or impair the usefulness of the USACE project. USACE Section 408 permission is needed to ensure that congressionally authorized projects continue to provide their intended benefits to the public. The USACE intends to adopt BOEM's EIS to support its decision on any permits or permissions requested under Section 10 of the RHA, Section 404 of the CWA, and Section 14 of the RHA. The USACE would adopt the EIS per 40 CFR 1506.3 if, after its independent review of the document, it concludes that the EIS satisfies the USACE's comments and recommendations. Based on its participation as a cooperating agency and its consideration of the Final EIS, the USACE would issue a record of decision (ROD) to formally document its decision on the Proposed Action.

ES.3 Public Involvement

On June 8, 2022, BOEM issued a Notice of Intent (NOI) to prepare an EIS consistent with NEPA regulations (40 CFR Parts 1500-1508) to assess the potential impacts of the Proposed Action and alternatives (87 *Federal Register* 34901). The NOI commenced a public scoping process for identifying issues and potential alternatives for consideration in the EIS. The formal scoping period was from June 8 through July 8, 2022. BOEM held three virtual public scoping meetings on June 21, 23, and 27, 2022 to solicit feedback and to identify issues and potential alternatives for consideration in the EIS. Throughout this timeframe, federal agencies, state and local governments, and the general public had the opportunity to help BOEM identify potential significant resources and issues, impact producing factors (IPFs), reasonable alternatives (e.g., geographic, seasonal, or other restrictions on construction and siting of facilities and activities), and potential mitigation measures to analyze in the EIS, as well as provide additional information. BOEM also used the NEPA scoping process to initiate the Section 106 consultation process under the NHPA (54 U.S.C. 300101 et seq.), as permitted by 36 CFR 800.2(d)(3), which requires federal agencies to assess the effects of projects on historic properties. Additionally, BOEM informed its Section 106 consultation by seeking public comment and input through the NOI regarding the identification of historic properties or potential effects on historic properties from activities associated with approval of the COP. The NOI requested comments from the public in written form, delivered by hand or by mail, or through the [Government regulations](#) web portal. BOEM reviewed and considered all scoping comments in the development of the Final EIS and used the comments to identify alternatives for analysis.

On October 6, 2023, BOEM issued a Notice of Availability of the Draft EIS, initiating a 45-day public comment period from October 6 to November 20 (88 *Federal Register* 69658). BOEM held two in-person public meetings on October 24 and 26, 2023 and two virtual public meetings on October 19 and 30, 2023. Public comments were received through Regulations.gov on docket number BOEM- 2023-0050, via email and mail to a BOEM representative, written comments submitted at in-person meetings and oral comments transcribed during both the in-person and virtual public meetings. BOEM received a total of 1,833 comment submissions from federal and state agencies, local governments, non-governmental organizations, and the general public during the comment period. BOEM assessed and considered all the comments received in preparation of the Final EIS.

ES.4 Alternatives

Under NEPA, a reasonable range of alternatives framed by the purpose and need must be developed for analysis for any major federal action. The alternatives should be “reasonable”, which the USDOl has defined as those that are “technically and economically practical or feasible and meet the purpose and need of the proposed action.”³ BOEM considered alternatives to the Proposed Action that were screened using BOEM’s *Process for Identifying Alternatives for Environmental Reviews of Offshore Wind Construction and Operations Plans pursuant to the National Environmental Policy Act* (BOEM 2022).

The Final EIS evaluates the No Action alternative and four action alternatives (one of which has sub-alternatives). The action alternatives are not mutually exclusive; BOEM may select a combination of alternatives that meet the purpose and need of the proposed Project. The alternatives are as follows:

- Alternative A – No Action Alternative
- Alternative B – Proposed Action (Preferred Alternative)
- Alternative C – Landfall and Onshore Export Cable Routes Alternative
 - Alternative C-1 includes the Towers Beach landfall and a terrestrial-based Onshore Export Cable Route
 - Alternative C-2 includes the 3R’s Beach landfall and terrestrial-based Onshore Export Cable Routes
- Alternative D – No Surface Occupancy to Reduce Visual Impacts Alternative, and
- Alternative E – Habitat Impact Minimization Alternative

Alternatives considered but dismissed from detailed analysis and the rationale for their dismissal are described in Section 2.2.

³ 43 CFR 46.420(b). The terms “practical” and “feasible” are not intended to be synonymous (73 *Federal Register* 61331, October 15, 2008).

ES.4.1 Alternative A – No Action Alternative

Under the No Action Alternative, BOEM would not approve the COP. Project construction and installation, O&M, and decommissioning would not occur, and no additional permits or authorizations for the Project would be required. Any potential environmental and socioeconomic impacts, including benefits, associated with the Project (as described under the Proposed Action) would not occur. However, all other existing ongoing or other reasonably foreseeable future activities described in Appendix D, *Planned Activities Scenario*, would continue. The ongoing effects of the No Action Alternative serve as the baseline against which all action alternatives are evaluated. Under the No Action Alternative, impacts on marine mammals incidental to construction activities would not occur. Therefore, NMFS would not issue the requested authorization under the MMPA to US Wind.

Over the life of the proposed Project, other reasonably foreseeable future impact-producing offshore wind and non-offshore wind activities would be implemented, which would cause changes to the existing baseline conditions even in the absence of the Proposed Action. The continuation of all other existing and reasonably foreseeable future activities described in Appendix D (Planned Activities Scenario) without the Proposed Action serves as the baseline for the evaluation of cumulative impacts.

ES.4.2 Alternative B—Proposed Action (Preferred Alternative)

The Proposed Action is to construct, operate, maintain, and decommission an up to 2.2GW wind energy facility in the Lease Area, with the western edge located approximately 10.1 miles (16.2 kilometer) off the coast of Maryland. The project design envelope (PDE) would consist of up to 121 WTG ranging from 14.7 to 18 MW each, up to four offshore substations (OSSs), inter-array cables in strings of four to six linking the WTGs to the OSSs, and substation interconnector cables linking the OSSs to each other. The Proposed Action includes a 1 nautical mile (1.9 kilometer) setback from the traffic separation scheme (TSS) from Delaware Bay which removes 7 of the 121 WTG positions, resulting in a total of 114 WTGs. Up to four offshore export cables (installed within one Offshore Export Cable Route) would transition to a landfall at 3R's Beach via horizontal directional drilling (HDD). From the landfall, the cables would continue along the Inshore Export Cable Route within Indian River Bay to connect to an onshore substation adjacent to the point of interconnection (POI) at the Indian River substation owned by Delmarva Power and Light (DPL) near Millsboro, Delaware. The Proposed Action includes construction of new substations adjacent to the existing substation (US Wind 2024).

Development of the wind energy facility would occur within the range of design parameters described in the COP (Volume I; US Wind 2024) and summarized in Appendix C, *Project Design Envelope and Maximum-Case Scenario*. The Project includes MarWin, a wind farm of approximately 300 MW for which the State of Maryland awarded to US Wind ORECs in 2017; Momentum Wind, consisting of approximately 808 MW for which the State of Maryland awarded additional ORECs in 2021; and build-out of the remainder of the Lease Area to fulfill ongoing, government-sanctioned demands for offshore wind energy. A description of construction and installation, O&M, and decommissioning activities for the Proposed Action is included in Sections 2.1.2.1 to 2.1.2.3. The Maryland Offshore Wind COP (US Wind 2024) and all other supporting volumes ([Maryland Offshore Wind Construction and](#)

Operations Plan for Commercial Lease OCS-A 0490) contain additional details on Project design, and are incorporated by reference throughout this EIS.

ES.4.3 Alternative C – Landfall and Onshore Export Cable Route Alternative

Alternative C was developed through the scoping process for the EIS in response to comments requesting an alternative to minimize impacts on Indian River Bay. Under Alternative C, the Landfall and Onshore Export Cable Route Alternative (“Landfall Alternative”), the construction, O&M, and eventual decommissioning of an up to 2.2 GW wind energy facility on the OCS offshore Maryland would occur within the range of the design parameters outlined in the COP (US Wind 2024), subject to applicable mitigation measures. This alternative includes an Onshore Export Cable Route that avoids crossing Indian River Bay and the Indian River (i.e., Inshore Export Cable Route). Offshore Project components within the Lease Area (WTGs, OSSs, inter-array cables, and Met Tower) would be the same as the Proposed Action (Alternative B). Each of the below sub-alternatives may be individually selected, subject to meeting the purpose and need.

- Alternative C-1 includes the Towers Beach landfall (i.e., exclusion of the 3R’s Beach landfall), and a terrestrial Onshore Export Cable Route from the Towers Beach landfall to the Indian River substation (POI) (Onshore Export Cable Route 2). This would be contingent on selection of Offshore Cable Route 2 (northern route). Under Alternative C-1, the offshore export cables would make landfall at Towers Beach, approximately 5 miles (7.7 kilometers) north of the Indian River Inlet, in an existing parking lot within Delaware Seashore State Park. When the offshore cables reach the landfall, they will be pulled into a cable duct that positions the cables underground to subterranean transition vaults and then run via Onshore Export Cable Route 2 to the POI utilizing Delaware Department of Transportation (DelDOT) ROWs.
- Alternative C-2 includes the 3R’s Beach landfall similar to the Proposed Action (i.e., exclusion of the Towers Beach landfall); however, only terrestrial Onshore Export Cable Routes from the 3R’s Beach landfall to the Indian River substation would be considered (i.e., Onshore Export Cable Routes 1a, 1b, and 1c). This would be contingent on selection of Offshore Cable Route 1 (southern route). When the offshore cables reach the landfall, they will be pulled into a cable duct that positions the cables underground to subterranean transition vaults and then run via an Onshore Export Cable Route to the specific POI utilizing DelDOT ROWs, except for portions of Onshore Export Cable Routes 1b and 1c that will utilize a Sussex County ROW under development.

ES.4.4 Alternative D – No Surface Occupancy to Reduce Visual Impacts Alternative

Alternative D was identified during the scoping process for the EIS in response to public comments concerning the visual impacts of the Project. Under Alternative D, the Viewshed Alternative, the construction, O&M, and eventual decommissioning of an up to 2.2 GW wind energy facility on the OCS offshore Maryland would occur within the range of the design parameters outlined in the COP (US Wind 2024), subject to applicable mitigation measures. This alternative would result in the exclusion of 32 WTG positions and 1 OSS within 14 miles (22.5 kilometers) of shore associated with the future development phase. The 14-mile (22.5-kilometer) exclusion allows for full development of MarWin and

Momentum and fulfillment of existing power purchase agreements, while still allowing site selection flexibility. The public comment process proposed a 15-mile (24.1 kilometer) exclusion zone for WTGs, but the difference of 1 mile in the exclusion zone is not likely to result in a significant reduction in impact. Thus, the benefit gained in an additional mile of exclusion (15-mile versus 14-mile [24.1 kilometer versus 22.5 kilometer]) would not warrant the added strain on the Project, given the currently identified WTG capacity, and the risk of failure to meet current power purchase agreements.

ES.4.5 Alternative E – Habitat Impact Minimization Alternative

Alternative E was identified through the scoping process for the EIS in response to comments received requesting an alternative to minimize impacts on offshore benthic habitats. Under Alternative E, the Habitat Impact Minimization Alternative, the construction, O&M, and eventual decommissioning of an up to 2.2 GW wind energy facility on the OCS offshore Maryland would occur within the range of the design parameters outlined in the COP (US Wind 2024), subject to applicable mitigation measures. This alternative would result in the removal of up to 11 WTG positions, removal/realignment of associated inter-array cables (if applicable), and realignment of the offshore export cables. Micrositing the WTGs and cables may be necessary to avoid areas of concern (AOCs; i.e., sensitive benthic habitat).

ES.5 Environmental Impacts

This Final EIS uses a four-level classification scheme to characterize the potential beneficial impacts and adverse impacts of alternatives as either **negligible**, **minor**, **moderate**, or **major**. Resource-specific adverse and beneficial impact level definitions are presented in each Chapter 3 resource section.

BOEM analyzes the impacts of past and ongoing activities in the absence of the Project as the No Action Alternative. The No Action Alternative serves as the existing baseline against which all action alternatives are evaluated. BOEM also separately analyzes cumulative impacts of the No Action Alternative, which considers all other ongoing and reasonably foreseeable future activities, including offshore wind and non-offshore wind projects, described in Appendix D, *Planned Activities Scenario*. In this analysis, the cumulative impacts of the No Action Alternative serve as the future baseline against which the cumulative impacts of all action alternatives are evaluated. Table ES-1 summarizes the impacts of each alternative and the cumulative impacts of each alternative. Under the No Action Alternative, the environmental and socioeconomic impacts of the action alternatives would not occur.

NEPA implementing regulations (40 CFR 1502.16) require that an EIS evaluate the potential unavoidable adverse impacts associated with a proposed action. Adverse impacts that can be reduced by mitigation measures but not eliminated are considered unavoidable. The same regulations also require that an EIS review the potential impacts of irreversible or irretrievable commitments of resources resulting from implementation of a proposed action. Irreversible commitments occur when the primary or secondary impacts from the use of a resource either destroy the resource or preclude it from other uses. Irretrievable commitments occur when a resource is consumed to the extent that it cannot recover or be replaced.

Table ES-1. Summary and comparison of impacts among Alternatives with no mitigation measures

Resource	Alternative A No Action Alternative	Alternative B Proposed Action (Preferred Alternative)	Alternative C Landfall and Onshore Export Cable Route Alternative	Alternative D No Surface Occupancy to Reduce Visual Impacts Alternative	Alternative E Habitat Impact Minimization Alternative
Air Quality					
Alternative Impacts ¹	Minor to Moderate	Minor to Moderate; Minor to Moderate beneficial	Minor to Moderate; Minor to Moderate beneficial	Minor to Moderate; Minor to Moderate beneficial	Minor to Moderate; Minor to Moderate beneficial
Cumulative Impacts ²	Minor to Moderate; Minor beneficial	Minor to Moderate; Minor to Moderate beneficial	Minor to Moderate; Minor to Moderate beneficial	Minor to Moderate; Minor to Moderate beneficial	Minor to Moderate; Minor to Moderate beneficial
Water Quality					
Alternative Impacts ¹	Minor	Minor	Minor	Minor	Minor
Cumulative Impacts ²	Minor	Minor	Minor	Minor	Minor
Bats					
Alternative Impacts ¹	Negligible	Negligible	Negligible	Negligible	Negligible
Cumulative Impacts ²	Negligible	Negligible	Negligible	Negligible	Negligible
Benthic Resources					
Alternative Impacts ¹	Moderate	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial
Cumulative Impacts ²	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial
Birds					
Alternative Impacts ¹	Minor	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial
Cumulative Impacts ²	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial	Moderate; Moderate beneficial
Coastal Habitats and Fauna					
Alternative Impacts ¹	Moderate	Moderate	Moderate	Moderate	Moderate
Cumulative Impacts ²	Moderate	Moderate	Moderate	Moderate	Moderate
Finfish, Invertebrates and EFH					
Alternative Impacts ¹	Moderate	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial
Cumulative Impacts ²	Moderate	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial

Resource	Alternative A No Action Alternative	Alternative B Proposed Action (Preferred Alternative)	Alternative C Landfall and Onshore Export Cable Route Alternative	Alternative D No Surface Occupancy to Reduce Visual Impacts Alternative	Alternative E Habitat Impact Minimization Alternative
Marine Mammals¹					
Incremental Impacts ³	No incremental effect	Moderate for mysticetes (except for NARW) and harbor porpoise Minor for NARW, all other odontocetes, and pinnipeds Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except for NARW) and harbor porpoise Minor for NARW, all other odontocetes, and pinnipeds Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except for NARW) and harbor porpoise Minor for NARW, all other odontocetes, and pinnipeds Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except for NARW) and harbor porpoise Minor for NARW, all other odontocetes, and pinnipeds Minor beneficial impacts for odontocetes and pinnipeds
Alternative Impacts ¹	Moderate for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds
Cumulative Impacts ²	Moderate impacts for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate impacts for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate impacts for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate impacts for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds	Moderate impacts for mysticetes (except NARW), odontocetes, and pinnipeds Major for the NARW ⁴ Minor beneficial impacts for odontocetes and pinnipeds

Resource	Alternative A No Action Alternative	Alternative B Proposed Action (Preferred Alternative)	Alternative C Landfall and Onshore Export Cable Route Alternative	Alternative D No Surface Occupancy to Reduce Visual Impacts Alternative	Alternative E Habitat Impact Minimization Alternative
Sea Turtles					
Alternative Impacts ¹	Minor	Minor	Minor	Minor	Minor
Cumulative Impacts ²	Minor	Minor	Minor	Minor	Minor
Wetlands					
Alternative Impacts ¹	Minor	Minor	Minor	Minor	Minor
Cumulative Impacts ²	Moderate	Moderate	Moderate	Moderate	Moderate
Commercial Fisheries and For-Hire Recreational Fishing					
Alternative Impacts ¹	Minor to Major long-term impacts on commercial fisheries and Moderate long-term impacts on for-hire recreational fisheries	Minor to Major; Minor beneficial impacts for some for-hire recreational fishing operations	Minor to Major; Minor beneficial impacts for some for-hire recreational fishing operations	Minor to Major; Minor beneficial impacts for some for-hire recreational fishing operations	Minor to Major; Minor beneficial impacts for some for-hire recreational fishing operations
Cumulative Impacts ²	Major long-term impacts on commercial fisheries and Moderate impacts on for-hire recreational fisheries; Moderate beneficial long-term impact, particularly on the for-hire recreational fishing	Major	Major	Major	Major
Cultural Resources					
Alternative Impacts ¹	Moderate	Moderate	Moderate	Moderate	Moderate
Cumulative Impacts ²	Moderate	Moderate	Moderate	Moderate	Moderate
Demographics, Employment, and Economics					
Alternative Impacts ¹	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial
Cumulative Impacts ²	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial

Resource	Alternative A No Action Alternative	Alternative B Proposed Action (Preferred Alternative)	Alternative C Landfall and Onshore Export Cable Route Alternative	Alternative D No Surface Occupancy to Reduce Visual Impacts Alternative	Alternative E Habitat Impact Minimization Alternative
Environmental Justice					
Alternative Impacts ¹	Minor; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial
Cumulative Impacts ²	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial
Land Use and Coastal Infrastructure					
Alternative Impacts ¹	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial
Cumulative Impacts ²	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial	Minor; Minor beneficial
Navigation and Vessel Traffic					
Alternative Impacts ¹	Moderate	Moderate	Moderate	Moderate	Moderate
Cumulative Impacts ²	Moderate	Moderate	Moderate	Moderate	Moderate
Other Uses					
Alternative Impacts ¹	Marine mineral extraction, Minor	Marine mineral extraction, Moderate	Marine mineral extraction, Moderate	Marine mineral extraction, Moderate	Marine mineral extraction, Moderate
	Aviation and air traffic, Negligible	Aviation and air traffic, Negligible	Aviation and air traffic, Negligible	Aviation and air traffic, Negligible	Aviation and air traffic, Negligible
	Military and national security uses, Negligible	Military and national security uses, Moderate	Military and national security uses, Moderate	Military and national security uses, Moderate	Military and national security uses, Moderate
	Radar systems, Negligible	Radar systems, Minor	Radar systems, Minor	Radar systems, Minor	Radar systems, Minor
	Cables and pipelines, Negligible	Cables and pipelines, Negligible	Cables and pipelines, Negligible	Cables and pipelines, Negligible	Cables and pipelines, Negligible
	Scientific research and surveys, Moderate	Scientific research and surveys, Major	Scientific research and surveys, Major	Scientific research and surveys, Major	Scientific research and surveys, Major
	Search and Rescue, Minor	Search and Rescue, Minor	Search and Rescue, Minor	Search and Rescue, Minor	Search and Rescue, Minor
Cumulative Impacts ²	Marine mineral extraction, Minor	Marine mineral extraction, Moderate	Marine mineral extraction, Moderate	Marine mineral extraction, Moderate	Marine mineral extraction, Moderate
	Aviation and air traffic, Negligible	Aviation and air traffic, Negligible to Minor	Aviation and air traffic, Negligible to Minor	Aviation and air traffic, Negligible to Minor	Aviation and air traffic, Negligible to Minor

Resource	Alternative A No Action Alternative	Alternative B Proposed Action (Preferred Alternative)	Alternative C Landfall and Onshore Export Cable Route Alternative	Alternative D No Surface Occupancy to Reduce Visual Impacts Alternative	Alternative E Habitat Impact Minimization Alternative
Cumulative Impacts ²	Military and national security, Minor	Military and national security, Moderate	Military and national security, Moderate	Military and national security, Moderate	Military and national security, Moderate
	Radar systems, Moderate	Radar, systems, Negligible to Minor	Radar, systems, Negligible to Minor	Radar, systems, Negligible to Minor	Radar, systems, Negligible to Minor
	Cables and pipelines, Negligible	Cables and pipelines, Negligible to Minor	Cables and pipelines, Negligible to Minor	Cables and pipelines, Negligible to Minor	Cables and pipelines, Negligible to Minor
	Scientific research and surveys, Major	Scientific research and surveys, Major	Scientific research and surveys, Major	Scientific research and surveys, Major	Scientific research and surveys, Major
	Search and rescue, Minor	Search and rescue, Negligible to Minor	Search and rescue, Negligible to Minor	Search and rescue, Negligible to Minor	Search and rescue, Negligible to Minor
Recreation and Tourism					
Alternative Impacts ¹	Negligible	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial
Cumulative Impacts ²	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial	Moderate; Minor beneficial
Visual Resources					
Alternative Impacts ¹	Minor	Major	Major	Major	Major
Cumulative Impacts ²	Major	Major	Major	Major	Major

Impact rating colors are as follows: orange = major; yellow = moderate; green = minor; light green = negligible or beneficial to any degree. All impact levels are assumed to be adverse unless otherwise specified as beneficial. Where impacts are presented as multiple levels, the color representing the most adverse level of impact has been applied.

¹ Alternative impacts are inclusive of baseline conditions and impacts from ongoing activities for each resource as described in their respective sections in Chapter 3, Affected Environment and Environmental Consequences.

² Cumulative impacts represent alternative impacts (with the baseline) plus other foreseeable future impacts.

³ Incremental impacts (i.e., alternative impacts without the baseline) were included at NMFS' request in order to support determinations under the Marine Mammal Protection Act.

⁴ Impacts were assessed as major for the No Action Alternative and Proposed Action scenarios for North Atlantic right whale (NARW) because ongoing activities such as entanglement and vessel strikes from non-offshore wind activities continue to compromise the viability of the species due to their low population numbers and downward population trends. The complete list of impact-producing factors that determined the impact range is described in Section 3.1 and Appendix F, Table F-1 of this Final EIS.

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Abbreviations and Acronyms

°C	degree Celsius
°F	degree Fahrenheit
ac	acre
AC	alternating current
ADLS	aircraft detection lighting system
APE	area of potential effect
AOC	area of concern
ASLF	Ancient submerged landform feature
AWEA	American Wind Energy Association
BA	Biological Assessment
BIA	Biologically Important Area
BMP	best management practice
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CAA	Clean Air Act
CEJST	Climate and Economic Justice Screening Tool
CFR	Code of Federal Regulations
cm	centimeter
CMECS	Coastal and Marine Ecological Classification Standard
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
COBRA	Co-benefits Risk Assessment
COP	Construction and Operations Plan
CPAPARS	Consolidated Port Approaches Port Access Route Studies
CWA	Clean Water Act
dB	decibel
DelDOT	Delaware Department of Transportation
DNREC	Delaware Department of Natural Resources and Environmental Control
EA	environmental assessment
EFH	essential fish habitat
EIS	environmental impact statement
EMF	electromagnetic field
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration

FDR	Facility Design Report
FIR	Fabrication and Installation Report
ft	foot
ft ²	square foot
G&G	geological and geophysical
GDP	gross domestic product
GHG	greenhouse gas
GSOE	Garden State Offshore Energy
GW	gigawatt
ha	hectare
HAP	hazardous air pollutant
HDD	horizontal directional drilling
in.	inch
IPF	impact-producing factor
IWG	Interagency Working Group
km	kilometer
km ²	square kilometer
km/h	kilometers per hour
kn	knot
Lease Area	Renewable Energy Lease Number OCS-A 0490
LEDPA	Least Environmentally Damaging Practicable Alternative
LME	Large Marine Ecosystem
LSZ	Landscape Similarity Zone
LWCF	Land and Water Conservation Fund
m	meter
m ²	square meter
MAB	Mid-Atlantic Bight
MABS	Mid-Atlantic Baseline Studies
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
MDE	Maryland Department of the Environment
Met Tower	meteorological tower
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mi	mile
mi ²	square mile
mm	millimeter
MMPA	Marine Mammal Protection Act
MMS	Minerals Management Service
MSA	Magnuson-Stevens Fishery Conservation and Management Act

MSL	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NMFS	National Marine Fisheries Service
nmi	nautical mile
NO ₂	nitrogen dioxide
NO _x	nitrogen oxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPS	National Park Service
NPDES	National Pollutant Discharge Elimination System
O ₃	ozone
O&M	operations and maintenance
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OREC	offshore renewable energy credit
OSRP	Oil Spill Response Plan
OSS	offshore substation
PAHs	polycyclic aromatic hydrocarbons
PAPE	preliminary area of potential effects
Pb	lead
PDE	Project Design Envelope
PM _{2.5}	particulate matter with a diameter less than or equal to 2.5 microns
PM ₁₀	particulate matter with a diameter less than or equal to 10 microns
POI	point of interconnection
Project	Maryland Offshore Wind Project
PSU	practical salinity unit
Q	quarter
RHA	Rivers and Harbors Act
ROD	Record of Decision
ROV	remotely operated vehicle
ROW	right-of-way
RSZ	rotor-swept zone
SAP	Site Assessment Plan
SAV	submerged aquatic vegetation
SO ₂	sulfur dioxide

SPCC	Spill Prevention, Control, and Countermeasure (Plan)
SR	State Route
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Places
TPA	Tradepoint Atlantic
TSS	traffic separation scheme
U.S.	United States
U.S.C.	United States Code
US Wind	US Wind Inc.
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDOJ	United States Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
WEA	Wind Energy Area
WTG	wind turbine generator

Chapter 1

Introduction



1 Introduction

This Final Environmental Impact Statement (EIS) assesses the potential biological, socioeconomic, physical, and cultural impacts that could result from the construction, operations and maintenance (O&M), and conceptual decommissioning of the Maryland Offshore Wind Project (Project) proposed by US Wind Inc. (US Wind), in its Construction and Operations Plan (COP).⁴ The Project described in the COP and this Final EIS would be up to 2,200 megawatts (MW) in scale and sited 10.1 statute miles (mi) (16.2 kilometers [km]) off the coast of Maryland, within the area of Renewable Energy Lease Number OCS-A 0490 (Lease Area). The Project is designed to serve demand for renewable energy in the Delmarva Peninsula, including Maryland.

This Final EIS was prepared following the requirements of the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] 4321–4370f) and its implementing regulations (40 CFR Parts 1500-1508). This Final EIS will inform the Bureau of Ocean Energy Management (BOEM) in deciding whether to approve, approve with modifications, or disapprove the COP (30 Code of Federal Regulations [CFR] 585.628).

1.1 Background

In 2009, the U.S. Department of the Interior (USDOI) announced final regulations for the Outer Continental Shelf (OCS) Renewable Energy Program, which was authorized by the Energy Policy Act of 2005, Public Law 109-58. The Energy Policy Act provisions implemented by BOEM provide a framework for issuing renewable energy leases, easements, and rights-of-way (ROWs) for OCS activities (Section 1.3). BOEM's Renewable Energy Program occurs in four distinct phases: (1) regional planning and analysis, (2) lease issuance, (3) site assessment, and (4) construction and operations. The history of BOEM's planning and leasing activities offshore Maryland is summarized in Table 1-1.

⁴ The Maryland Offshore Wind Project COP and appendices are available on BOEM's website: [Maryland Offshore Wind Construction and Operations Plan for Commercial Lease OCS-A 0490](#).

Table 1-1. History of BOEM planning and leasing offshore Maryland

Year	Milestone
2010	On November 9, 2010, BOEM initiated the leasing process offshore Maryland by issuing a Request for Interest (RFI) to gauge industry's interest in obtaining commercial wind leases in an area offshore of Maryland (75 <i>Federal Register</i> 68824).
2010 - 2013	BOEM coordinates Outer Continental Shelf renewable energy activities offshore Maryland with its federal, state, local, and tribal government partners through its Intergovernmental Renewable Energy Task Force. BOEM coordinated six Task Force Meetings for Maryland including April 14, 2010, July 14, 2010, March 23, 2011, June 24, 2011, January 29, 2013 and June 27, 2013.
2012	On February 3, 2012, BOEM published a Call for Information and Nominations for Commercial Leasing for Wind Power on the OCS Offshore Maryland in the <i>Federal Register</i> . The public comment period for the Call closed on March 19, 2012. In response, BOEM received six commercial indications of interest (77 <i>Federal Register</i> 5552).
2012	On February 3, 2012, BOEM published in the <i>Federal Register</i> a Notice of Availability of a final Environmental Assessment and Finding of No Significant Impact for commercial wind lease issuance and site assessment activities on the Atlantic OCS offshore New Jersey, Delaware, Maryland, and Virginia (77 <i>Federal Register</i> 5560).
2013	On December 18, 2013, BOEM published a Proposed Sale Notice requesting public comments on the proposal to auction two leases offshore Maryland for commercial wind energy development (78 <i>Federal Register</i> 76643).
2014	On July 3, 2014, BOEM announced that it published a Final Sale Notice, which stated a commercial lease sale would be held August 19, 2014, for the Wind Energy Area offshore Maryland (79 <i>Federal Register</i> 38060). The Maryland Wind Energy Area was auctioned as two leases (OCS-A 0489 and OCS-A 0490). US Wind won both leases.
2016–2018	On April 7, 2016, US Wind submitted a Site Assessment Plan for commercial wind lease. BOEM approved the plan on March 22, 2018, for Renewable Energy Lease Number OCS-A 0490.
2018	On January 26, 2018, BOEM received a request from US Wind to merge Renewable Energy Lease Numbers OCS-A 0489 and OCS-A 0490 into a single lease, with the single retaining lease number OCS-A 0490. BOEM approved the request on March 1, 2018.
2020–2021	On October 22, 2020, US Wind submitted a new Site Assessment Plan for Renewable Energy Lease Number OCS-A 0490. BOEM approved the plan on May 5, 2021.
2020–2024	On August 11, 2020, US Wind submitted its COP for the construction, operations, and conceptual decommissioning of the Project within the Lease Area. Updated versions of the COP were submitted on November 23, 2021, March 3, 2022, May 27, 2022, November 30, 2022, May 27, 2023, July 28, 2023, February 19, 2024, May 10, 2024, June 25, 2024, and July 1, 2024.
2022	On June 8, 2022, BOEM published a Notice of Intent to Prepare an EIS for US Wind's Proposed Wind Energy Facility Offshore Maryland (87 <i>Federal Register</i> 34901).

Year	Milestone
2023	On October 6, 2023, BOEM published a Notice of Availability of a Draft EIS initiating a 45-day public comment period for the Draft EIS (88 <i>Federal Register</i> 69658).
2024	On August 2, 2024, BOEM published a Notice of Availability for the Final EIS initiating a minimum 30-day mandatory waiting period, during which BOEM is required to pause before issuing a ROD.

Source: BOEM 2022a,b, [BOEM State activities - Maryland](#), [BOEM State activities Offshore Wind](#).

BOEM = Bureau of Ocean Energy Management; COP = Construction and Operations Plan; EIS = environmental impact statement; OCS = Outer Continental Shelf

1.2 Purpose of and Need for the Proposed Action

In Executive Order (EO) 14008, “*Tackling the Climate Crisis at Home and Abroad*,” issued January 27, 2021, President Joseph R. Biden stated that it is the policy of the United States (U.S.): “to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure.”

Through a competitive leasing process under 30 CFR 585.211, BOEM awarded US Wind with Renewable Energy Lease Number OCS-A 0490 in 2014. During the same competitive lease sale, BOEM also awarded US Wind with Renewable Energy Lease Number OCS-A 0489. By a lease amendment, made effective March 1, 2018, OCS-A 0489 and OCS-A 0490 were merged into a single lease, Renewable Energy Lease Number OCS-A 0490. Renewable Energy Lease Number OCS-A 0489 automatically terminated. US Wind has the exclusive right to submit a COP for activities within the Lease Area. US Wind has submitted a COP to BOEM proposing the construction, installation, operation, and conceptual decommissioning of an offshore wind energy facility in the Lease Area (the Project).

US Wind’s goal is to develop a commercial-scale, offshore wind energy project in the Lease Area. The Project (full build-out) comprises as many as 121 wind turbine generators (WTGs), up to 4 offshore substations (OSSs), up to 4 offshore export cables, and 1 meteorological tower (Met Tower), with a total of up to 123 structures in a gridded array pattern distributed across the Lease Area. The offshore export cables are planned to make landfall in Sussex County, Delaware. The Project will be interconnected to the onshore electric grid by up to four new 230 kilovolt (kV) export cables to new US Wind onshore substations, with an anticipated connection to the existing Indian River substation near Millsboro, Delaware (Figure 1-1).

The Project would generate up to 2,200 MW of wind energy to the Delmarva Peninsula, including Maryland, in fulfillment of state and federal clean energy standards and targets (COP, Volume I, Section 1.1.2; US Wind 2024). The Project includes (1) MarWin, a wind farm of approximately 300 MW for which US Wind was awarded offshore renewable energy credits (ORECs) in 2017 by the State of

Maryland; (2) Momentum Wind, consisting of approximately 808 MW for which the State of Maryland awarded additional ORECs in 2021; and (3) future development of the remainder of the Lease Area to fulfill ongoing, government-sponsored demands for offshore wind energy.

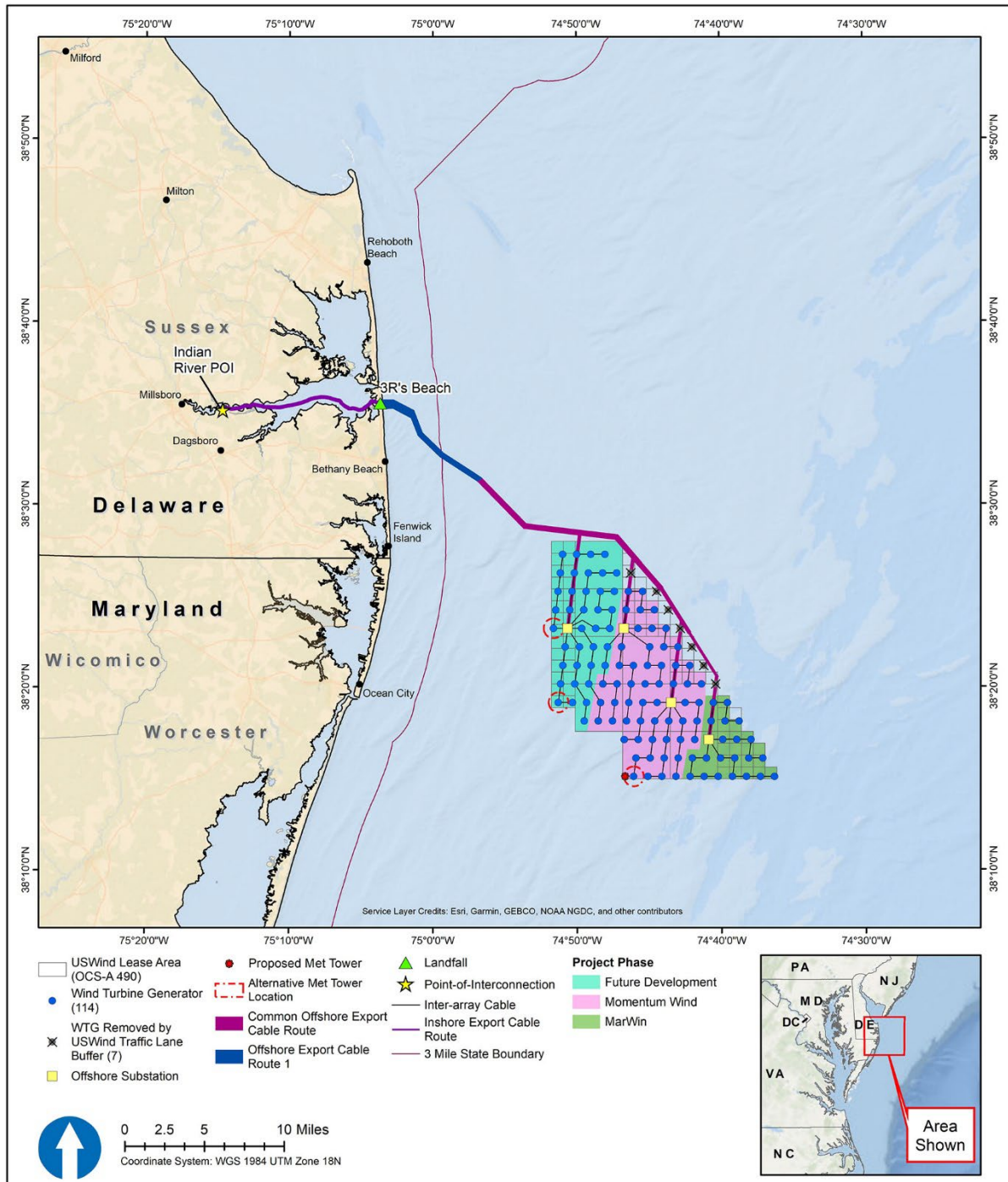


Figure 1-1. Maryland offshore wind Proposed Action - Preferred Alternative

Based on (1) BOEM's authority under the Outer Continental Shelf Lands Act (OCSLA) to authorize renewable energy activities on the OCS, and EO 14008, (2) the Administration's goal to deploy 30 gigawatts (GW) of offshore wind energy capacity in the U.S. by 2030, while protecting biodiversity and promoting ocean co-use,⁵ and (3) in consideration of the goals of US Wind, the purpose of BOEM's action is to determine whether to approve, approve with modifications, or disapprove US Wind's COP. BOEM will make this determination after weighing the factors in subsection 8(p)(4) of OCSLA that are applicable to plan decisions and in consideration of the above goals. BOEM's action is needed to fulfill its duties under the lease, which requires BOEM to make a decision on the lessee's plan to construct and operate a commercial-scale, offshore wind energy facility in the Lease Area.

In addition, the National Oceanic and Atmospheric Administration's (NOAA's) National Marine Fisheries Service (NMFS) anticipates one or more requests for authorization under the Marine Mammal Protection Act (MMPA) to take marine mammals incidental to construction activities related to the Project. NMFS's issuance of an MMPA incidental take authorization would be a major federal action connected to BOEM's action (40 CFR 1501.9(e)(1)).⁶ The purpose of the NMFS action—which is a direct outcome of US Wind's request for authorization to take marine mammals incidental to specified activities associated with the Project (e.g., pile driving)—is to evaluate US Wind's request pursuant to specific requirements of the MMPA and its implementing regulations administered by NMFS, consider impacts of US Wind's activities on relevant resources, and, if appropriate, issue the permit or authorization. NMFS must render a decision regarding the request for authorization as part of the agency's responsibilities under the MMPA (16 U.S.C. 1371(a)(5)(A)) and its implementing regulations. If NMFS makes the findings necessary to issue the requested authorization, NMFS intends to adopt, after independent review, BOEM's EIS to support that decision and fulfill its NEPA requirements.

The U.S. Army Corps of Engineers (USACE) Baltimore District anticipates requests for authorization of a permit action to be undertaken through authority delegated to the district engineer by 33 CFR 325.8, under Section 10 of the Rivers and Harbors Act of 1899 (RHA) (33 U.S.C. 403) and Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344). In addition, it is anticipated that a Section 408 permission will be required pursuant to Section 14 of the RHA (33 U.S.C. 408) for any proposed alterations that could alter, occupy, or use any federally authorized civil works projects. The USACE considers issuance of permits/permissions under these three delegated authorities a major federal action connected to BOEM's action (40 CFR 1501.9(e)(1)). The need for the Project, as provided in the COP (Volume I, Section 1.1.2; US Wind 2024) and reviewed by the USACE for NEPA purposes, is to provide a commercially viable offshore wind energy project within the Lease Area to help the State of Maryland achieve its renewable energy goals. The basic Project purpose, as determined by the USACE for Section 404(b)(1) guidelines evaluation, is offshore wind energy generation. The overall Project purpose

⁵ FACT SHEET: Biden Administration Jump starts Offshore Wind Energy Projects to Create Jobs, Interior, Energy, Commerce, and Transportation Departments Announce New Leasing, Funding, and Development Goals to Accelerate and Deploy Offshore Wind Energy and Jobs, The White House, [Biden Administration Jumpstarts Offshore Wind Energy Projects to Create Jobs](#).

⁶ Under the MMPA, a "take" means "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C. 1362).

for Section 404(b)(1) guidelines evaluation, as determined by the USACE, is the construction and operation of a commercial-scale, offshore wind energy project for renewable energy generation in Lease Area OCS-A 0490 offshore Maryland and transmission/distribution to the PJM energy grid.⁷

The purpose of USACE Section 408 action, as determined by Engineer Circular 1165-2-220, is to evaluate US Wind's request and determine whether the proposed alterations are injurious to the public interest or impair the usefulness of the USACE project. USACE Section 408 permission is needed to ensure that congressionally authorized projects continue to provide their intended benefits to the public. The USACE intends to adopt BOEM's EIS to support its decision on any permits or permissions requested under Section 10 of the RHA, Section 404 of the CWA, and Section 14 of the RHA. The USACE would adopt the EIS per 40 CFR 1506.3 if, after its independent review of the document, it concludes that the EIS satisfies the USACE's comments and recommendations. Based on its participation as a cooperating agency and its consideration of the Final EIS, the USACE would issue a record of decision (ROD) to formally document its decision on the Proposed Action.

1.3 Regulatory Overview

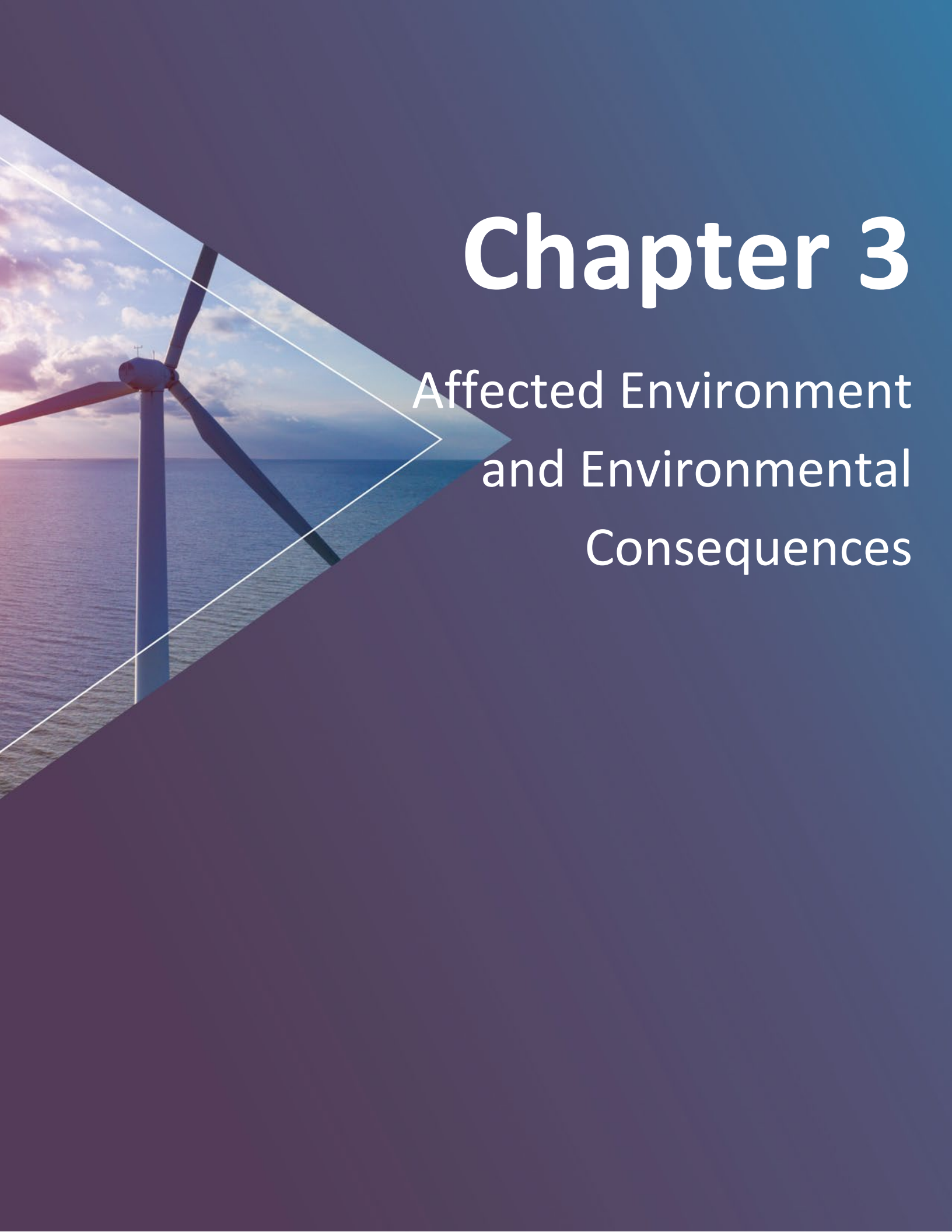
The Energy Policy Act of 2005 amended the OCSLA (43 U.S.C. 1331 et seq.)⁸ by adding a new subsection 8(p) that authorizes the Secretary of the Interior to issue leases, easements, and ROWs in the OCS for activities that "produce or support production, transportation, or transmission of energy from sources other than oil and gas," which include wind energy projects.

The Secretary of the Interior delegated this authority to the former Minerals Management Service (MMS), and later to BOEM. Final regulations implementing the authority for renewable energy leasing under the OCSLA (30 CFR Part 585) were promulgated on April 22, 2009.⁹ These regulations prescribe BOEM's responsibility for determining whether to approve, approve with modifications, or disapprove US Wind's COP (30 CFR 585.628). The reorganization of Title 30, Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf, (30 CFR Parts 285, 585, and 586) enacted on January 31, 2023, reassigned existing regulations governing safety and environmental oversight and enforcement of OCS renewable energy activities from BOEM to Bureau of Safety and Environmental Enforcement (BSEE).

⁷ Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf, 74 *Federal Register* 19638–19871 (April 29, 2009)

⁸ Public Law No. 109-58, 119 Stat. 594 (2005)

⁹ Renewable Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf, 74 *Federal Register* 19638–19871 (April 29, 2009)

A photograph of a wind turbine on the ocean, partially obscured by a dark blue geometric overlay. The turbine is white with three blades, and the ocean is a deep blue. The sky is a mix of blue and white clouds. The overlay is a dark blue shape that covers the right side and bottom of the image, with a white line forming a triangle that points towards the turbine.

Chapter 3

Affected Environment and Environmental Consequences

3 Affected Environment and Environmental Consequences

This chapter analyzes the impacts of the Proposed Action and Alternatives by establishing the existing baseline of affected resources; predicting the direct and indirect impacts; and then evaluating those impacts when added to the baseline and considered in the context of the reasonably foreseeable impacts of future planned activities. This chapter thus addresses the affected environment, also known as the existing baseline, for each resource area and the potential environmental consequences to those resources from implementation of the alternatives described in Chapter 2, Alternatives. In addition, this section addresses the impact of the alternatives when combined with other past, present, or reasonably foreseeable planned activities (i.e., cumulative impacts) using the methodology and assumptions outlined in Chapter 1, Introduction, and Appendix D (Planned Activities Scenario). Appendix D describes other ongoing and planned activities within the GAA for each resource. These actions may occur on the same time scale as the proposed Project or could occur later in time but are still reasonably foreseeable.

In accordance with Section 1502.21 of the CEQ regulations implementing NEPA, BOEM identified information that was incomplete or unavailable for the evaluation of reasonably foreseeable impacts analyzed in this chapter. The identification and assessment of incomplete or unavailable information is presented in Appendix E (Analysis of Incomplete and Unavailable Information).

The No Action Alternative is first analyzed to predict the impacts of the baseline (as described in Section 1.6.1), the status quo. A subsequent analysis is conducted to assess the cumulative impacts to baseline conditions as future planned activities occur (as described in Section 1.6.2). Separate impact conclusions are drawn based on these separate analyses. This Final EIS also conducts separate analyses to evaluate the impacts of the action alternatives when added to the baseline condition of resources (as described in Section 1.6.1) and to evaluate cumulative impacts by analyzing the impacts of the action alternatives when added to both the baseline (as described in Section 1.6.1) and the impacts of future planned activities (as described in Section 1.6.2).

3.1 Impact-Producing Factors

In 2019, BOEM completed a study of impact-producing factors (IPFs) on the North Atlantic OCS to consider in an offshore wind development planned activities scenario (BOEM 2019). That study, incorporated in this document by reference, provides the following insights regarding IPFs related to wind development:

- Identifies cause-and-effect relationships between renewable energy projects (and their potential sources of impact) and resources potentially affected by such projects.
- Classifies those relationships into IPFs through which renewable energy projects could affect resources.
- Identifies the types of actions and activities to be considered in a cumulative impact scenario.
- Identifies actions and activities that may affect the same physical, biological, economic, or cultural resources as renewable energy projects and states that such actions and activities may have the same IPFs as offshore wind projects.

The BOEM (2019) study identifies the relationships between IPFs associated with specific past, present, and reasonably foreseeable future actions in the North Atlantic OCS. BOEM determined the relevance of each IPF to each resource analyzed in this Final EIS.

For the analysis in the Final EIS, IPFs for the Project were identified. Table 3.1-1 provides a brief description of the primary IPFs involved in this analysis, including examples of sources and activities that result in each IPF. The IPFs cover all phases of the Project, including construction, O&M, and conceptual decommissioning. Each IPF is assessed in relation to ongoing activities, planned activities, and the Proposed Action. Planned activities include non-offshore wind activities and future offshore wind activities. If an IPF was not associated with the Project, it was not included in the analysis. Appendix F, *Impact-Producing Factor Tables and Assessment of Resources with Minor (or Lower) Impacts*, includes the IPF tables for each resource considered in this Final EIS.

In addition to adverse effects, beneficial effects may result from the Project and the development of renewable energy sources on the OCS in general. The study, *Evaluating Benefits of Offshore Wind Energy Projects in NEPA* (BOEM 2017), examined this in depth. Benefits from the development of offshore wind energy projects are further examined throughout this chapter and can fall into three primary categories: electricity system benefits, environmental benefits, and socioeconomic benefits.

Table 3.1-1. Primary impact-producing factors (IPFs) addressed in this analysis

IPF	Sources and Activities	Description
Accidental releases	• Mobile sources (e.g., vessels) • Installation, operation, and maintenance of onshore or offshore stationary sources (e.g., wind turbine generators, offshore substations, transmission lines, inter-array cables)	Refers to unanticipated releases or spills into receiving waters of a fluid or other substance, such as fuel, hazardous materials, suspended sediment, invasive species, trash, or debris. Accidental releases or spills are distinct from routine discharges, consisting of authorized operational effluents and which are restricted via treatment and monitoring systems and permit limitations.
Air emissions	• Combustion-related stationary or mobile emission sources (e.g., generators [onshore and offshore], support vessels, vehicles, aircraft) • Non-combustion-related sources (e.g., leaks from tanks and switchgears)	Refers to emission sources that emit regulated air pollutants (gaseous or particulate matter) into the atmosphere. Releases can occur onshore and offshore.
Anchoring	• Anchoring of vessels • Attachment of a structure to the seafloor by use of an anchor, mooring, or gravity-based weighted structure (i.e., bottom-founded structure)	Refers to seafloor disturbances (anything below mean higher high water) related to any offshore construction or maintenance activities. Refers to an action or activity that disturbs or attaches objects to the seafloor.
Cable emplacement and maintenance	• Dredging or trenching • Cable placement • Seafloor profile alterations • Sediment deposition and burial • Cable protection of concrete mattress and rock placement	Refers to seafloor disturbances (anything below mean higher high water) related to the installation and maintenance of new offshore submarine cables. Cable placement methods include trenchless installation (e.g., horizontal directional drilling [HDD], direct pipe, auger bore), jetting, vertical injection, control flow excavation, trenching, and plowing.

IPF	Sources and Activities	Description
Discharges/intakes	• Vessels • Structures • Onshore point and non-point sources • Dredged material ocean disposal • Installation, operation, and maintenance of submarine transmission lines, cables, and infrastructure • HVDC converter cooling system	Refers to routine, permitted, operational effluent discharges of pollutants to receiving waters. Types of discharges may include bilge water, ballast water, deck drainage, gray water, fire suppression system test water, chain locker water, exhaust gas scrubber effluent, condensate, seawater cooling system intake and effluent, and horizontal directional drilling (HDD) fluid. Water pollutants include produced water, manufactured or processed hydrocarbons, chemicals, sanitary waste, and deck drainage. Rainwater, freshwater, or seawater mixed with any of these constituents is also considered a pollutant. These discharges are restricted to uncontaminated or properly treated effluents that require best management practice or numeric pollutant concentration limitations as required through U.S. Environmental Protection Agency (USEPA) National Pollutant Discharge Elimination System (NPDES) permits or U.S. Coast Guard (USCG) regulations. Refers to the discharge of solid materials, such as the deposition of sediment at approved offshore disposal or nourishment sites and cable protection. Discharge of dredged or fill material may be regulated through the Clean Water Act. Refers to entrainment/impingement as a result of intakes used by cable-laying equipment and in HVDC converter cooling systems.

IPF	Sources and Activities	Description
Electric and magnetic fields (EMFs) and cable heat	• Substations • Power transmission cables • Inter-array cables • Electricity generation	Power generation facilities and cables produce electric fields (proportional to the voltage) and magnetic fields (proportional to flow of electric current) around power cables and generators. Three major factors determine levels of the magnetic and induced electric fields from offshore wind energy projects: (1) the amount of electrical current being generated or carried by the cable, (2) the design of the generator or cable, and (3) the distance of organisms from the generator or cable. Refers to thermal effects of the transmission of electrical power, depending on cable design and burial depth.
Gear utilization	• Monitoring surveys	Refers to entanglement and bycatch during monitoring surveys.
Land disturbance	• Vegetation clearance • Excavation • Grading • Placement of fill material	Refers to land disturbances (anything above mean higher high water) during onshore construction activities.
Lighting	• Vessels or offshore structures above or underwater • Onshore infrastructure	Refers to lighting associated with offshore wind development and activities that utilize offshore vessels, and which may produce light above the water onshore and offshore, as well as underwater.
Noise	• Aircraft • Vessels • Turbines • Geophysical and geotechnical surveys • O&M • Onshore and offshore construction and installation • Impact pile driving • Dredging and trenching • Unexploded ordinance (UXO) detonations	Refers to noise from various sources. Commonly associated with construction activities, geophysical and geotechnical surveys, and vessel traffic. May be impulsive (e.g., impact pile driving) or non-impulsive (e.g., drilling), intermittent (e.g., high-resolution geophysical signals) or continuous (e.g., vessel noise), and broadband (e.g., explosives) or tonal (e.g., SONAR). May also be noise generated by turbines or interactions of the turbines with wind and waves.

IPF	Sources and Activities	Description
Port utilization	• Expansion and construction • Maintenance • Use • Revitalization	Refers to an action or activity associated with port activity, upgrades, or maintenance that occur from increased economic activity only as a result of the Project. Includes activities related to port expansion and construction such as placement of dredged materials, dredging to deepen channels for larger vessels, and maintenance dredging.
Presence of structures	• Onshore structures, including towers and transmission cable infrastructure • Offshore structures, including wind turbine generators, offshore substations, and scour/cable protection	Refers to the post-construction, long-term presence of onshore or offshore structures.
Traffic	• Aircraft • Vessels (construction, O&M, surveys) • Vehicles • Towed arrays/equipment	Refers to marine and onshore vessel and vehicle use, including use in support of surveys such as geophysical and geotechnical, fisheries monitoring, and biological monitoring surveys.
Energy generation/security	• Wind energy production	Refers to the generation of electricity and its provision of reliable energy sources compared with other energy sources (i.e., energy security). Associated with renewable energy development operations.
Climate change	• Emissions of greenhouse gases	Refers to the effects of climate change, such as warming and sea level rise, and increased storm severity or frequency. Ocean acidification refers to the effects associated with the decreasing pH of seawater from rising levels of atmospheric carbon dioxide.

HVDC = high voltage direct current; O&M = operations and maintenance

3.2 Mitigation Identified for Analysis in the Environmental Impact Statement

During development of the Final EIS, and in coordination with cooperating agencies, BOEM considered potential mitigation measures that could further avoid, minimize, or mitigate impacts on the physical, biological, socioeconomic, and cultural resources assessed in this document. The potential mitigation measures are described in Appendix G, Table G-2, and analyzed in the relevant resource sections of this chapter. Mitigation measures for completed consultations, authorizations, and permits are included in the Final EIS. All US Wind-committed measures (Lessee proposed measures [LPM]) are part of the Proposed Action. The additional mitigation measures presented in Appendix G, Table G-2 may not all be within BOEM's statutory and regulatory authority to require; however, other jurisdictional governmental agencies may potentially require them. BOEM may choose to incorporate one or more of the additional mitigation measures in the preferred alternative, and/or to incorporate one or more additional measures in the ROD and adopt those measures as conditions of COP approval.¹⁵

3.3 Definition of Impact Levels

This Final EIS uses a four-level classification scheme to characterize potential beneficial and adverse impacts of action alternatives, including the Proposed Action. Resource-specific adverse and beneficial impact level definitions are presented in each resource section.

When considering the duration of impacts, this Final EIS uses the following terms:

- Short-term effects are effects that may extend up to 3 years. Construction and conceptual decommissioning activities are anticipated to occur for a duration of 2 to 3 years. An example would be clearing of onshore shrubland vegetation during construction; the area would be revegetated when construction is complete, and, after revegetation is successful, this effect would end. Short-term effects may be further defined as temporary if the effects end as soon as the activity ceases. An example would be road closures or traffic delays during onshore export cable installation. Once construction is complete, the effect would end.
- Long-term effects are effects that may extend for more than 3 years and may extend for the expected life of the Project (35 years¹⁶). An example would be habitat loss where a foundation has been installed.

¹⁵ While this EIS analyzes all of the mitigation measures expected to be required through consultations and MMPA authorization, BOEM anticipates that some necessary authorizations for the proposed Project may issue after BOEM reaches a decision on the COP, in which case BOEM can include conditions of approval to ensure that its approval remains consistent with the terms of those future approvals.

¹⁶ As noted in Section 2.1.2.2, BOEM assumes in this Final EIS that the proposed Project would have an operating period of 35 years. US Wind's lease with BOEM (Lease OCS-A 0490) has an operations term of 25 years that commences on the date of COP approval. (See [OCS-A-0489_OCS-A-0490-Lease-Consolidation.pdf \(boem.gov\)](#); see also 30 CFR 585.235(a)(3).) US Wind would need to request and be granted an extension of its operations term from BOEM under the regulations at 30 CFR 585.425 et seq. in order to operate the proposed Project for longer than 25 years.

- Permanent effects are effects that extend beyond the life of the Project. An example would be the conversion of land to support new onshore facilities or the placement of scour protection that is not removed as part of decommissioning.

Beyond the impact definitions provided in the following resource-specific sections, consideration has been given to impact definitions for ongoing and planned actions. The following terms are used to describe the impacts contributed by the action alternative to cumulative impacts.

- Undetectable: The impact contributed by the action alternative to cumulative impacts from all ongoing and planned activities is so small that it is impossible or extremely difficult to discern from natural variation.
- Noticeable: The impact contributed by the action alternative, while evident and observable, is relatively small in proportion to the cumulative impacts from all ongoing and planned activities.
- Appreciable: The impact contributed by the action alternative constitutes a large portion of the cumulative impacts from all ongoing and planned activities.

3.4 Physical Resources

3.4.1 Air Quality

This section discusses potential impacts on air quality from the Proposed Action, action alternatives, and ongoing and planned activities in the air quality geographic analysis area (Figure 3.4.1-1). The air quality geographic analysis area includes the airshed within 25 mile (40 kilometer) of the Lease Area (corresponding to the OCS permit area) and the airshed within 15.5 mile (25 kilometer) of onshore construction areas and ports that may be used for the Project. The geographic analysis area encompasses the region subject to United States Environmental Protection Agency (USEPA) review as part of an OCS permit for the Project under the Clean Air Act (CAA). The Maryland Department of the Environment (MDE) is EPA's delegated OCS permitting authority based on the Project's location on the OCS offshore Maryland. The geographic analysis area also considers potential air quality impacts associated with the onshore construction areas and the port(s) outside the OCS permit area. The dispersion characteristics of emissions from marine vessels, equipment, and similar emission sources that would be used during proposed construction and O&M activities would likely have maximum potential air quality impacts occurring within a few miles of the source, as would decommissioning activities if emissions are similar to those during construction. BOEM selected the 15.5-mile (25-kilometer) distance to provide a reasonable buffer to ensure that the locations of maximum potential air quality impact would be considered.

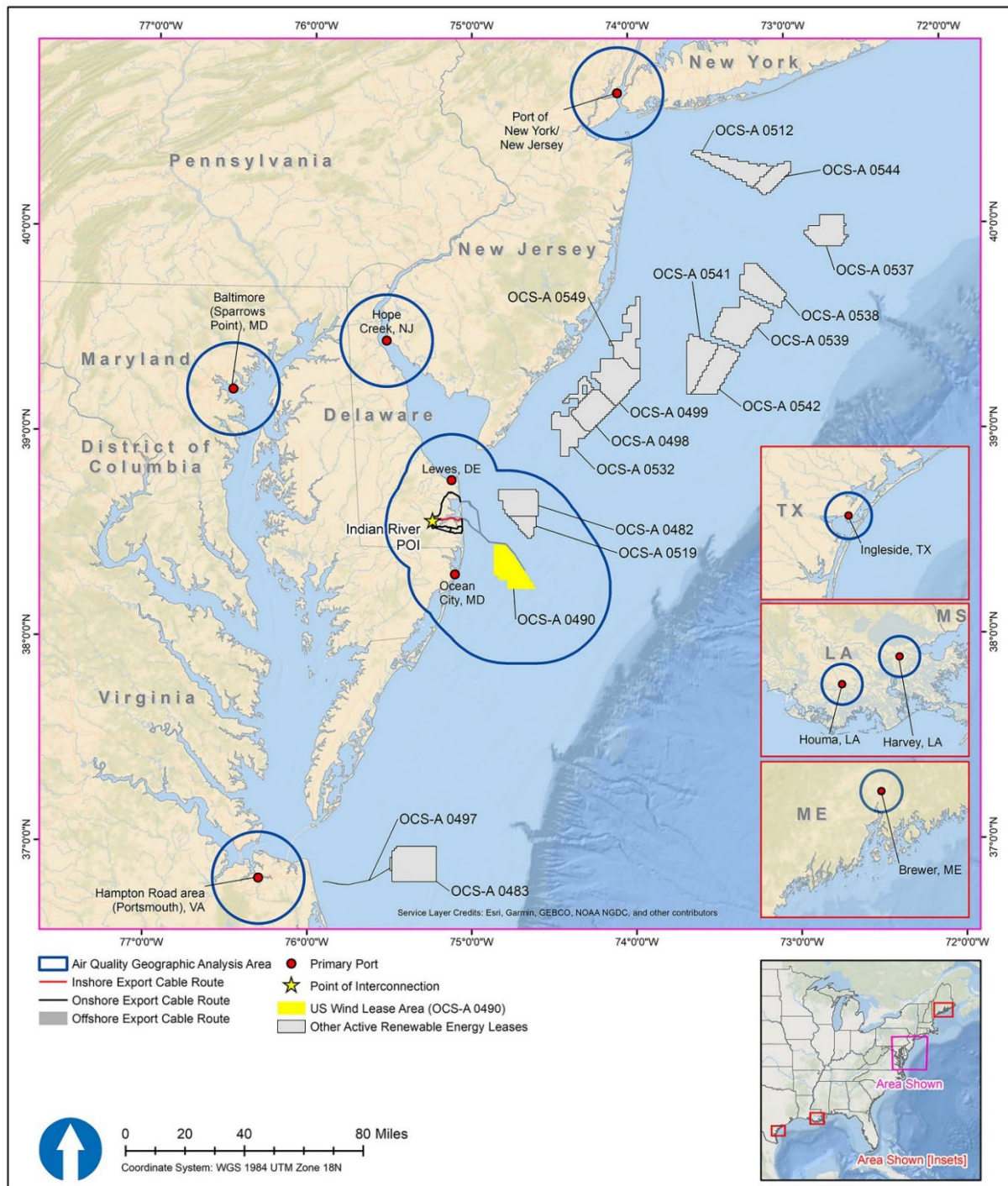


Figure 3.4.1-1. Air quality geographic analysis area

3.4.1.1 Description of the Affected Environment

Air quality is characterized by comparing the ambient air concentrations of criteria pollutants to the National Ambient Air Quality Standards (NAAQS), which were established by the USEPA to be protective of public health and the environment. The CAA established two types of NAAQS: (1) primary standards, which set limits to protect public health, including the health of “sensitive” populations (e.g., asthmatics, children, the elderly); and (2) secondary standards, which set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. NAAQS were established in 40 CFR 50 for six criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM_{2.5} and PM₁₀, particulate matter with a diameter less than or equal to 2.5 and 10 microns [μm], respectively), and sulfur dioxide (SO₂). Current NAAQS levels are provided in Table 3.4.1-1 (USEPA 2024).

Table 3.4.1-1. National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
CO	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
	Primary and Secondary	1 hour	35 ppm	Not to be exceeded more than once per year
Pb	Primary and Secondary	Rolling 3-month average	0.15 μg/m ³	Not to be exceeded
NO ₂	Primary	1 hour	100 ppb	98 th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 year	53 ppb	Annual mean
O ₃	Primary and Secondary	8 hours	0.07 ppm	Annual fourth-highest daily maximum 8-hour concentration averaged over 3 years
PM _{2.5}	Primary	1 year	9 μg/m ³	Annual mean, averaged over 3 years
	Secondary	1 year	15.0 μg/m ³	Annual mean, averaged over 3 years
PM ₁₀	Primary and Secondary	24 hours	35 μg/m ³	98 th percentile, averaged over 3 years
	Primary and Secondary	24 hours	150 μg/m ³	Not to be exceeded more than once per year on average over 3 years
SO ₂	Primary	1 hour	75 ppb	99 th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

μg/m³ = micrograms per cubic meter; CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter smaller than 2.5 microns; PM₁₀ = particulate matter smaller than 10 microns; ppb = parts per billion; ppm = parts per million; SO₂ = sulfur dioxide

When the monitored concentrations in an area exceed the NAAQS for any pollutant, the area is classified as “nonattainment” for that pollutant. The surrounding areas impacted by the Project as shown in Figure 3.4.1-1 are assessed for attainment status. Maryland is presently “in attainment” with the NAAQS, except for 12 counties in the Baltimore and Washington, D.C. metropolitan areas (Anne Arundel, Baltimore, Baltimore City, Calvert, Carroll, Cecil, Charles, Frederick, Harford, Howard, Montgomery, and Prince George’s counties). These counties are in densely populated, urban core areas and are in nonattainment with the O₃ NAAQS (all 12 counties) and the SO₂ NAAQS (Anne Arundel and Baltimore counties). Virginia is presently in attainment with the NAAQS, except for Giles County, which is in nonattainment with the SO₂ NAAQS, and nine counties in the Washington, D.C., metropolitan area (Alexandria City, Arlington, Fairfax, Fairfax City, Falls Church, Loudoun, Manassas Park City, Manassas City, and Prince William counties), which are in nonattainment with the O₃ NAAQS. Delaware is presently in attainment with the NAAQS, except for two counties in the Wilmington metropolitan area (Newcastle and Sussex counties), which are in nonattainment with the O₃ NAAQS (USEPA 2022). New Castle, Sussex, and Kent counties were all nonattainment for the 1979 1-Hour O₃ standard and 1997 8-Hour O₃ standard, but those standards have since been revoked. Although revoked, the control measures in place for the 1979 and 1997 O₃ standards remain in effect.

O₃ is a regional air pollutant issue. Prevailing southwest to west winds carry air pollution from the Ohio River Valley, where major nitrogen oxide (NO_x) emission sources (e.g., power plants) are located, and from mid-Atlantic metropolitan areas to the northeast, contributing to high O₃ concentrations in these areas. Major SO₂ sources include power plants and other industrial facilities burning coal and other fossil fuels.

The USEPA Regional Haze Rule requires state and federal agencies to develop and implement air quality plans to reduce the air pollution that causes decreased visibility in national wilderness areas and parks designated as Class I areas. The Class I areas closest to the Project are the Brigantine Wilderness Area in New Jersey and Shenandoah National Park in Virginia. Federal land managers must be notified of facilities that will be located within 62 miles (100 kilometers) of a Class I area. The Project is not within that distance of any Class I area and is not anticipated to impact visibility in any Class I area.

The Project will require air permitting and air dispersion modeling in accordance with the USEPA and Maryland Department of the Environment (MDE). The Air Quality Permit to Construct will address the implementation of best available control technology for Project emissions sources and will require air dispersion modeling to comply with Code of Maryland Regulation (COMAR) 26.11.15.06, Ambient Impact Requirement. If required, US Wind will follow MDE Guidance Document “Demonstrating Compliance with the Ambient Impact Requirement under the Toxic Air Pollutant (TAP) Regulations (COMAR 26.11.15.06)” (MDE 2016a) or other acceptable air dispersion modeling procedures for the analysis.

US Wind submitted the Notice of Intent required for 40 CFR 55.4 on August 5, 2022, to commence the air permitting process with the USEPA and MDE. Additionally, a standard offshore and coastal dispersion modeling protocol was sent by US Wind to the MDE on September 16, 2022. The MDE responded on December 27, 2022, that an alternative modeling protocol should be used. All alternative modeling protocols require approval by USEPA Region 3. On January 26, 2023, US Wind, the USEPA, and the MDE met to discuss the alternative protocol review and approval process. The approval process, including receipt of data from the USEPA, is expected to take approximately 2 months from submission. Additional mitigation measures may be identified during the best available control technology and modeling processes. On March 10, 2023, US Wind submitted the alternative modeling protocol to MDE, and submitted an OCS Air Permit Application on August 17, 2023. An alternative model request was approved by MDE on September 11, 2023 and the application was deemed administratively complete on January 4, 2024. As part of the technical review, and in response to requests from MDE, the U.S. Fish and Wildlife Service (USFWS) and the National Park Service (NPS) requested that the Lessee provide long-range air transport modeling. On May 23, 2024, US Wind provided a Class I AQRV air quality modeling protocol to address CALPUFF (a multi-layer, multi-species nonsteady-state puff dispersion model) long range transport modeling for assessing Class I area Air Quality Related Values (AQRVs). The nearest Class I areas to the Project are the Edwin B. Forsythe National Wildlife Refuge (the Brigantine Wilderness Area) in New Jersey (126 km), and the Shenandoah National Park in Virginia (290 km). The Class I AQRV protocol was approved by USFWS and NPS on May 29 and June 4, 2024 respectively. The modeling is expected to be submitted in July 2024, and results will not be available for this FEIS. MDE anticipates issuance of the OCS air permits on or before January 4, 2025.

3.4.1.2 Impact-Level Definitions for Air Quality

Definitions of impact levels for air quality are provided in Table 3.4.1-2. Impact levels are intended to serve NEPA purposes only and are not intended to establish thresholds or other requirements with respect to permitting under the CAA. Appendix F, Table F-1, identifies potential IPFs, issues, and indicators to assess impacts on air quality.

Table 3.4.1-2. Impact level definitions for air quality

Impact Level	Type of Impact	Definition
Negligible	Adverse	Increases in ambient pollutant concentrations due to Project emissions would not be detectable.
Negligible	Beneficial	Decreases in ambient pollutant concentrations due to Project emissions would not be detectable.
Minor to Moderate	Adverse	Increases in ambient pollutant concentrations due to Project emissions would be detectable but would not lead to exceedance of the NAAQS.
Minor to Moderate	Beneficial	Decreases in ambient pollutant concentrations due to Project emissions would be detectable.

Impact Level	Type of Impact	Definition
Major	Adverse	Changes in ambient pollutant concentrations due to Project emissions would lead to exceedance of the NAAQS.
Major	Beneficial	Decreases in ambient pollutant concentrations due to Project emissions would be larger than for minor to moderate impacts.

NAAQS = National Ambient Air Quality Standards

3.4.1.3 Impacts of Alternative A – No Action on Air Quality

Section 3.1 of the Final EIS explains the approach to predicting impacts related to the No Action Alternative. When analyzing the impacts of the No Action Alternative on air quality, BOEM considered the impacts of past and ongoing trends and activities, including ongoing non-offshore wind and ongoing offshore wind activities on the baseline conditions for air quality. BOEM separately analyzes how resource conditions will be affected over time as reasonably foreseeable activities are implemented. The cumulative impacts of the No Action Alternative considered the impacts of the No Action Alternative in combination with other planned non-offshore wind and offshore wind activities, as described in Appendix D, Planned Activities Scenario. Separate impact conclusions are presented for both scenarios.

3.4.1.3.1 Impacts of Alternative A – No Action

The Maryland Energy Administration (2022) projected that under current regulations and policies, emissions from electricity generation would decline through 2050 due to improvements in efficiency and switching to cleaner fuels. Maryland's Renewable Portfolio Standard includes carve-outs for offshore wind and requires the State to generate 50 percent of its electricity from renewable energy sources by 2030 and 100 percent by 2040. Under the No Action Alternative, without implementation of other offshore wind projects, the electricity that would have been generated by offshore wind would likely be provided by nuclear or natural gas as the dominant fuels for electricity generation in the interim. As a result, a continuation of ongoing activities under the No Action Alternative could lead to a smaller decline in emissions than would occur with offshore wind development. An overall mix of natural gas, solar, wind, and energy storage would likely occur in the future due to market forces and state energy policies. In addition to electricity generation, emissions from other ongoing activities, including vessel and vehicle emissions as well as accidental releases of fuel or other hazardous material, would continue to contribute to ongoing regional air quality impacts.

3.4.1.3.2 Cumulative Impacts of Alternative A—No Action

The cumulative impact analysis for the No Action Alternative considers the impacts of the No Action Alternative in combination with past, present and reasonably foreseeable future activities (without the Proposed Action). Impacts on air quality from fossil fuel facilities are expected to be mitigated partially by implementation of other planned offshore wind projects near the proposed geographic analysis area, including in regions off New England, New York, New Jersey, Delaware, and Maryland, to the extent that these wind projects would result in reduced emissions from fossil fuel power-generating facilities. Planned non-offshore wind activities within the geographic analysis area that contribute to cumulative impacts on air quality are generally associated with existing onshore land uses, including residential, commercial, industrial, and transportation activities as well as onshore construction activities. Other planned non-offshore activities that could contribute to air quality impacts include construction of undersea transmission lines, gas pipelines, and other submarine cables; marine minerals use and ocean dredged material disposal; military use; marine transportation; oil and gas activities; and onshore development activities (Appendix D, Section D.2 contains a complete description of planned activities). These planned non-offshore wind activities have the potential to affect air quality through their emissions and accidental releases. Impacts associated with climate change could affect ambient air quality through increased formation of ozone and particulate matter associated with increasing air temperatures. Appendix D, Table D1-1, presents a summary of potential impacts associated with ongoing and planned non-offshore wind activities by IPF for air quality.

Other planned offshore wind activities within the geographic analysis area that could contribute to impacts on air quality include:

- Construction of the Skipjack Wind I project (17 WTGs), expected 2026–2030
- Construction of the Garden State Wind project (96 WTGs), expected 2027–2030
- Construction of the Skipjack Wind II project (77 WTCs), expected 2028–2030

BOEM expects other offshore wind activities to affect air quality through the following primary IPFs.

Accidental releases: Planned offshore wind activities could release air toxins or hazardous air pollutants (HAPs) because of accidental chemical spills within the air quality geographic analysis area.

Section 3.4.2, *Water Quality*, includes a discussion of the nature of anticipated releases. Based on Appendix D, Table D2-3, up to 338,082 gallons (1,279,778 liters) of coolants, 673,545 gallons (2,549,646 liters) of oils and lubricants, and 196,437 gallons (743,595 liters) of diesel fuel would be contained in the 110 WTG and 3 OSS structures for wind energy projects (other than the Proposed Action) within the air quality geographic analysis area. If accidental releases occur, they would most likely be during construction but could occur during operations and decommissioning of offshore wind facilities. These may lead to short-term periods (hours to days)¹⁷ of HAP emissions through surface evaporation. HAP emissions would consist of volatile organic compounds (VOCs), which may lead to

¹⁷ For example, small diesel fuel spills (500 to 5,000 gallons [1,893 to 18,927 liters]) usually will evaporate and disperse within a day or less (NOAA 2006).

O₃ formation. By comparison, the smallest tanker vessel operating in these waters (a general-purpose tanker) has a capacity of between 3.2 and 8 million gallons (12.1 and 30.3 million liters). Tankers are relatively common in the area, and the total WTG chemical storage capacity within the air quality geographic analysis area is much less than the volume of hazardous liquids transported by ongoing activities (U.S. Energy Information Administration 2014). BOEM expects air quality impacts from accidental releases would be negligible because impacts would be short term and limited to the area near the accidental release location. Accidental releases would occur infrequently over a 25-year period, with a higher probability of releases during future project construction, but they would not be expected to contribute appreciably to overall impacts on air quality.

Air emissions: Most air pollutant emissions and air quality impacts from planned offshore wind projects would occur during construction, potentially from multiple projects occurring simultaneously. All projects would be required to comply with the CAA. Primary emission sources would include increased public and commercial vehicular traffic, air traffic, combustion emissions from construction equipment, and fugitive emissions from construction-generated dust for onshore portions of the projects. As wind energy projects come online, power generation emissions overall could decrease, and the region as a whole could realize a net benefit to air quality.

Offshore wind projects other than the Proposed Action that may result in air pollutant emissions and air quality impacts within the air quality geographic analysis area include projects within all or portions of lease areas OCS-A 0482 (Garden State Offshore Energy [GSOE] 1) and OCS-A 0519 (Skipjack Wind 1 and 2) (Appendix D, Table D2-4). These projects would produce 2,448 MW of renewable power from the installation of 110 WTGs. Based on the assumed offshore construction schedule, the projects within the air quality geographic analysis area would have overlapping construction periods beginning in 2026 and continuing through 2030.

Table 3.4.1-3 summarizes the total emissions of criteria pollutants and O₃ precursors from construction of offshore wind projects other than the Proposed Action within the air quality geographic analysis area as well as the annual emissions of criteria pollutants and O₃ precursors during operation of the projects. These emission estimates were developed by BOEM based on offshore wind demand, as discussed in their 2019 study, *National Environmental Policy Act Documentation for Impact-Producing Factors in the Offshore Wind Cumulative Impacts Scenario on the North Atlantic Outer Continental Shelf* (Appendix D, Table D2-4).

Table 3.4.1-3. Emissions (tons) from Project construction and operations, No Action Alternative

Phase	VOCs	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	CO _{2e}
Construction (Total, All Years)	141.4	1,271	5,740	189.8	187.6	42.65	370,372
Operations (Average Annual)	6.06	78.48	332.9	10.91	10.44	0.92	22,330

CO = carbon monoxide; CO_{2e} = carbon dioxide equivalent; NO_x = nitrogen oxide; PM_{2.5} = particulate matter smaller than 2.5 microns; PM₁₀ = particulate matter smaller than 10 microns; SO₂ = sulfur dioxide; VOC = volatile organic compound

Most emissions would occur from diesel-fueled construction equipment, vessels, and commercial vehicles. The magnitude of emissions and the resulting air quality impacts would vary spatially and temporally during the construction phases. Construction activity would occur at different locations and could overlap temporally with activities at other locations, including operational activities at previously constructed projects. As a result, air quality impacts would be minor to moderate, shifting spatially and temporally across the air quality geographic analysis area.

During operations, emissions from offshore wind projects within the air quality geographic analysis area would overlap temporally. However, operations would contribute few criteria pollutant emissions compared to construction and decommissioning. Operational emissions would come largely from commercial vessel traffic and emergency diesel generators. The combined operational emissions for all projects within the air quality geographic analysis area would vary by year as successive projects begin operation. Operational emissions would result in negligible air quality impacts because emissions would be intermittent, localized, and dispersed throughout the combined approximate 193,000 acres (78,104.3 hectares) of lease areas and vessel routes from the onshore O&M Facility.

Offshore wind energy development could help offset emissions from fossil fuels, potentially improving regional air quality and reducing greenhouse gases (GHGs). An analysis of five variable renewable power plant data sets, representing approximately 183 GWh, by Katzenstein and Apt (2009) estimated that carbon dioxide (CO₂) emissions can be reduced up to 80 percent and NO_x emissions can be reduced up to 50 percent by implementing wind energy projects¹⁸. Additionally, an analysis by Barthelmie and Pryor (2021) calculated that, depending on global trends in GHG emissions and the amount of wind energy expansion, development of wind energy could reduce predicted increases in global surface temperature by 0.5 to 1.4 degrees Fahrenheit (°F) (0.3 to 0.8 degrees Celsius [°C]) by 2100.

Estimations and evaluations of potential health and climate benefits from offshore wind activities for specific regions and project sizes rely on information about the air pollutant emission contributions of the existing and projected mixes of power generation sources, and generally estimate the annual health

¹⁸ Emissions reductions estimated by Katzenstein and Apt (2009) through use of multiple renewable energy sources, including solar and wind.

benefits of an individual, commercial-scale offshore wind project to be valued in the hundreds of millions of dollars (Kempton et al. 2005; Buonocore et al. 2016).

The potential health benefits of avoided emissions can be evaluated using the USEPA's Co-benefits Risk Assessment (COBRA) health impacts screening and mapping tool, which estimates the health and economic benefits of clean energy policies (USEPA 2020a). COBRA was used to analyze the avoided emissions that were calculated for development of 2,448 GW of planned wind power. Table 3.4.1-4 presents the estimated monetized health benefits and avoided mortality for this example scenario.

Table 3.4.1-4. Co-benefits Risk Assessment (COBRA) estimate of annual avoided health effects with 2,448 GW of reasonably foreseeable offshore wind power

Discount Rate ¹ (2023)	Monetized Total Health Benefits (million U.S. dollars/year)		Avoided Mortality (cases/year)	
	Low Estimate ²	High Estimate ²	Low Estimate ²	High Estimate ²
3 Percent	239.1	539.3	21	49
7 Percent	213.4	480.8	21	49

¹ The discount rate is used to express future economic values in present terms. Not all health effects and associated economic values occur in the year of analysis. Therefore, COBRA accounts for the "time value of money" preference (i.e., a general preference for receiving economic benefits now rather than later) by discounting benefits received later (USEPA 2020b).

² The low and high estimates are derived using two sets of assumptions about the sensitivity of adult mortality and non-fatal heart attacks to changes in ambient PM_{2.5} levels. Specifically, the high estimates are based on studies that estimated a larger effect of changes in ambient PM_{2.5} levels on the incidence of these health effects (USEPA 2020b).

BOEM anticipates the air quality impacts associated with offshore wind activities other than the Proposed Action in the geographic analysis area would result in minor to moderate adverse impacts due to emissions of criteria pollutants, VOCs, HAPs, and GHGs, mostly released during construction and decommissioning. Impacts would be minor to moderate because these emissions would increase ambient pollutant concentrations, though not by enough to cause a NAAQS violation. Offshore wind projects likely would lead to reduced emissions from fossil fuel power-generating facilities and consequently minor to moderate beneficial impacts on air quality.

Climate change: Construction and operation of offshore wind projects would produce GHG emissions (mostly CO₂) that contribute to climate change. CO₂ is relatively stable in the atmosphere and, for the most part, mixed uniformly throughout the troposphere and stratosphere. As such, the impact of GHG emissions does not depend on the source location. Increasing energy production from offshore wind projects could reduce regional GHG emissions by replacing energy derived from fossil fuels. This reduction could more than offset the GHG emissions from offshore wind projects. Additionally, this reduction in GHG emissions would be noticeable in the regional context, would contribute to reducing climate change, and would represent a moderate beneficial impact in the regional context. U.S. offshore wind projects would likely have a limited impact on global emissions and climate change, but they may be significant and beneficial as a component of many actions addressing climate change and integral for fulfilling state plans regarding climate change.

3.4.1.3.3 Conclusions

Impacts of Alternative A – No Action. Under the No Action Alternative, air quality would continue to reflect current regional trends and respond to IPFs introduced by other ongoing activities. Additionally, higher-emitting fossil fuel energy facilities could be built or kept in service to meet future power demand. These larger impacts would be mitigated partially by other offshore wind projects surrounding the geographic analysis area, including offshore Delaware, New Jersey, and Virginia. BOEM anticipates ongoing non-offshore wind activities would result in **minor to moderate** impacts on air quality due to air pollutant and GHG emissions during construction and operation. Continuation of current regional trends in energy development could include new power plants that could contribute to air quality and GHG impacts in Maryland and the Mid-Atlantic states.

Cumulative Impacts of Alternative A – No Action. In the context of other reasonably foreseeable environmental trends in the area, cumulative impacts on air quality from ongoing and planned activities, are expected to have continuing regional air quality impacts, primarily through air pollutant emissions and accidental releases. BOEM expects the combination of ongoing and planned activities other than offshore wind to result in minor to moderate cumulative impacts on air quality, primarily driven by recent market and permitting trends indicating future electric-generating units would most likely include natural-gas-fired facilities.

BOEM anticipates the No Action Alternative combined with all other planned activities (including other offshore wind activities) would result in **minor to moderate** adverse cumulative impacts due to emissions of criteria pollutants, VOCs, HAPs, and GHGs, mostly released during construction and decommissioning, and **minor beneficial** impacts on regional air quality after offshore wind projects are operational. Offshore wind activities in the geographic analysis area would contribute to the emissions of criteria pollutants, VOCs, HAPs, and GHGs, mostly released during construction and decommissioning; however, these emissions would not increase ambient pollutant concentrations enough to violate the NAAQS. Pollutant emissions during operations generally would be lower and more transient. Most air pollutant emissions and air quality impacts would occur during multiple overlapping project construction phases from 2026 through 2030. Overall, adverse air quality impacts from offshore wind projects are expected to be transient. Offshore wind projects likely would lead to reduced emissions from fossil fuel power-generating facilities and consequently minor to moderate beneficial impacts on regional air quality after offshore wind projects are operational.

3.4.1.4 Relevant Design Parameters and Potential Variances in Impacts for the Action Alternatives

This EIS analyzes the maximum case scenario; any potential variances in the Project build-out, as defined in the PDE, would result in impacts similar to or less than those described in the following sections. The following PDE parameters (Appendix C, *Project Design Envelope and Maximum Case Scenarios*) would influence the magnitude of impacts on air quality:

- Emission ratings of construction equipment and vehicle engines;

- Location of construction laydown areas;
- Choice of cable-laying locations and pathways;
- Choice of marine traffic routes to and from the Lease Area and Offshore Export Cable Route;
- Soil characteristics at excavation areas, which may affect fugitive emissions; and
- Emission control strategy for fugitive emissions due to excavation and hauling operations.

Changes to the design capacity of the WTGs would not alter the maximum potential air quality impacts for the Proposed Action and other action alternatives because the maximum case scenario involved the maximum number of WTGs allowed in the PDE.

US Wind has committed to measures to minimize impacts on air quality. US Wind will obtain any necessary CAA permits under the State of Maryland's delegated program and comply with applicable permit conditions. Low-sulfur fuels would be used to the extent practicable, and specific engines designed to reduce air pollution would be used when practicable, in addition to limiting engine idling times, complying with international air emission standards for marine vessels, and using engines with add-on emission controls where required (COP, Volume II, Section 5.3; US Wind 2024).

3.4.1.5 Impacts of Alternative B – Proposed Action on Air Quality

3.4.1.5.1 Impacts of Alternative B- Proposed Action

Construction and Installation

During the construction stage, the activities of additional workers, increased traffic congestion, additional commuting miles for construction personnel, and increased air polluting activities of supporting businesses could result in impacts on air quality. Fuel combustion and some incidental solvent use would cause construction related air emissions. Air pollutants would include CO, nOx, PM₁₀, PM_{2.5}, SO₂, VOCs, carbon dioxide equivalent (CO₂e) or GHG emissions, O₃, and total HAPs. The COP (Volume II, Appendix C1; US Wind 2024) provides a description of emission sources associated with the construction and operations stages of the Proposed Action. The total construction emissions of each pollutant for the Proposed Action are summarized Table 3.4.1-5 and in Appendix A of the Notice of Intent (NOI) to Submit an Application for an Outer Continental Shelf Air Permit (US Wind 2022). Construction equipment would use appropriate fuel-efficient engines and comply with all applicable air emission standards to keep combustion emissions and associated air quality impacts to a minimum. The combustion of fuels (diesel oil and gasoline) in the propulsion engines of vessels and stationary equipment on vessels installing the WTGs and OSSs (e.g., cranes, generators) will produce emissions of criteria pollutants. These emissions will primarily be NO_x and CO, with lesser amounts of VOCs, an O₃ precursor, and PM₁₀ (mostly in the form of PM_{2.5}), and negligible amounts of sulfur oxides (SO_x) and lead (leaded gasoline has been phased out in favor of unleaded gasoline).

Table 3.4.1-5. Proposed Action total construction emissions (tons)

Period	NO _x	VOCs	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e	HAPs
Year 1	249	10.9	192.2	16.3	8	1	16,517	0.2	0.04	16,534	1.5
Year 2	611	27.8	48.3	41.4	19	2	39,926	0.5	0.1	39,968	3.9
Year 3	500	14.9	262.1	22.2	16	2	32,755	0.3	0.1	32,792	2.1
Year 4	0	5.5	96.1	8.1	0	0	0	0.1	0.02	8.5	0.8
Total	1380	59.2	1,039.7	88.0	44	58	94,547	1.1	0.2	89,303	8.3

Source: Notice of Intent (NOI) to Submit an Application for an Outer Continental Shelf Air Permit

CH₄ = methane; CO = carbon monoxide; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; HAP = hazardous air pollutant; N₂O = nitrous oxide; NO_x = nitrogen oxide; PM_{2.5} = particulate matter smaller than 2.5 microns; PM₁₀ = particulate matter smaller than 10 microns; SO₂ = sulfur dioxide; VOC = volatile organic compound

Sum of individual values may not equal total due to rounding.

Note 1: Emissions for nOx, PM_{2.5}, and SO₂ based on BOEM Tool as provided in May 2022 US Wind Construction and Operations Plan (COP) and Project specific design criteria.

Note 2: The BOEM Tool uses EPA emission factors from the Ports Emissions Inventory Guidance/Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions Report (EPA 420-B-20-046, September 2020).

Note 3. Emission factors for VOC, CO, PM₁₀, CH₄, and HAPs were based on EPA emission factors from the Ports Emissions Inventory Guidance/Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions Report (EPA 420-B-20-046, September 2020).

The Proposed Action would affect air quality through the following primary IPFs during construction, operations, and decommissioning.

Onshore Activities and Facilities

Air emissions: Onshore air emissions would occur at the landfall site and at points of interconnection in Sussex County. The COP (Volume II, Section 17.2 and Appendix C1; US Wind 2024) provides additional information on land use and proposed ports. Onshore activities of the Proposed Action would consist primarily of HDD, duct bank construction, cable-pulling operations, and substation construction. Additional emissions related to the Project could occur at nearby ports used to transport material and personnel to and from the Project site. Emissions would primarily be from operation of diesel-powered equipment; vehicle activity such as bulldozers, excavators, and diesel trucks; and fugitive particulate emissions from excavation and hauling of soil. Low-sulfur fuels would be used to the extent practicable, and engines designed to reduce air pollution would be used when practicable, in addition to limiting engine idling times and using engines with add-on emission controls where practicable (COP, Volume II, Section 5.3; US Wind 2024).

Air emissions would be highly variable and limited in spatial extent at any given period and would result in minor impacts because they would be temporary in nature. Fugitive particulate emissions would vary depending on the spatial extent of the excavated areas, soil type, soil moisture content, and magnitude and direction of ground-level winds.

Offshore and Inshore Activities and Facilities

Accidental releases: Proposed Action construction could release air toxins or HAPs due to accidental chemical spills. The Proposed Action would have up to about 158,460 gallons (636,521 liters) of coolants, oils, lubricants, and diesel fuel in its 121 WTG foundations (PDE) and about 339,888 gallons (1,286,596 liters) of coolants, oils, lubricants, and diesel fuel in its 4 OSS foundations (COP, Volume I, Appendix A, Tables 7 and 8; US Wind 2024). Accidental spills of these fluids could lead to short-term periods of hazardous air pollutant emissions, such as VOCs through evaporation. VOC emissions would be an important precursor to O₃ formation. Air quality impacts would be short term and limited to the local area around the accidental release location. These activities would have a negligible air quality impact from the Proposed Action.

Accidental releases would occur infrequently over the 30-year period of operations with a higher probability of spills during construction of projects, but spills would not be expected to contribute appreciably to overall impacts on air quality. The total storage capacity within the air quality geographic analysis area is considerably less than the volumes of hazardous liquids being transported by ongoing activities such as tanker vessels traveling to and from Delaware Bay (Section 3.4.2, *Water Quality*).

Air emissions: Offshore air emissions would occur within the OCS, including state offshore waters. Offshore emissions would occur in the Lease Area and the Offshore Export Cable Route. The COP (Volume II, Section 17.2; US Wind 2024) provides additional information on land use and proposed ports. Air quality in the geographic analysis area may be affected by emissions of criteria pollutants from sources involved in the construction or maintenance of the Project and, potentially, during operations. These impacts, while generally localized to the areas near the emission sources, may occur at any location associated with the Project, be it offshore in the Lease Area or at any onshore construction or support site. O₃ levels in the region could also be affected.

The Project's WTGs, OSSs, and offshore export cables would produce minimal air pollutant emissions during normal operations from accidental releases, vessel emissions, and maintenance and testing. Air pollutant emissions from equipment used in the construction could affect air quality in the geographic analysis area and nearby coastal waters and shore areas. Most offshore emissions would occur temporarily during construction in the Lease Area and along the Offshore Export Cable Routes.

Most air pollutant and GHG emissions from the Proposed Action alone would come from the main engines, auxiliary engines, and auxiliary equipment on marine vessels used during offshore construction activities. Fugitive dust emissions would occur as a result of excavation and hauling of soil during onshore construction activities. Emissions from the OCS source, as defined in the CAA, would be permitted as part of the OCS air quality permit. The US Wind submitted its OCS air quality permit Notice of Intent to the USEPA on August 5, 2022 (Appendix A, *Required Environmental Permits and Consultations*). As part of the OCS air permitting process, the Project must demonstrate compliance with the NAAQS. The OCS air permitting process will include air dispersion modeling of emissions to demonstrate compliance with the NAAQS. As part of the air quality values analysis, the Project must demonstrate that significant visibility degradation would not occur as a result of increased haze or

plumes. US Wind would comply with the requirements of the OCS air permit, when issued, for emissions' reduction and mitigation. Lessee proposed mitigation measures are discussed in Appendix G, Table 1, and COP, Volume II, Section 1.5 (US Wind 2024). In addition, the OCS air permit requirements may include emission controls that meet Best Available Control Technology or Lowest Achievable Emission Rate criteria, development of emission offsets, or other mitigation measures.

Fuel combustion and solvent use would cause construction-related emissions. The air pollutants would include criteria pollutants, VOCs, HAPs, and GHGs. During the construction phase, the activities of additional workers, increased traffic congestion, additional commuting miles for construction personnel, and increased air-polluting activities of supporting businesses could have impacts on air quality. Construction equipment would comply with all applicable emissions and fuel-efficiency standards to minimize combustion emissions and associated air quality impacts. The total estimated construction emissions of each pollutant are summarized in Table 3.4.1-5.

Emissions from construction activities would vary throughout the construction and installation of offshore components. Emissions from offshore activities would occur during pile and scour protection installation, offshore cable laying, turbine installation, and OSS installation. Offshore construction-related emissions also would come from diesel-fueled generators used to temporarily supply power to the WTGs and OSSs so that workers could operate lights, controls, and other equipment before cabling is in place. There also would be emissions from engines used to power pile-driving hammers and air compressors used to supply compressed air to noise-mitigation devices during pile driving (if used). Emissions from vessels used to transport workers, supplies, and equipment to and from the construction areas would result in additional air quality impacts. The Project may need emergency generators at times, potentially resulting in increased emissions for limited periods. Overall, emissions from offshore Proposed Action construction would be measurable but unlikely to cause NAAQS violations and, thus, would have minor to moderate impacts on air quality.

During construction, the total emissions of criteria pollutants and O₃ precursors from all offshore wind projects, including the Proposed Action, proposed within the air quality geographic analysis area, summed over all construction years, would include 2,346 tons of CO, 10,313 tons of NO_x, 280.8 tons of PM₁₀, 275.9 tons of PM_{2.5}, 221.2 tons of SO₂, 202.5 tons of VOCs, and 664,987 tons of CO₂e. Most emissions would occur from diesel-fueled construction equipment, vessels, and commercial vehicles. The magnitude of the emissions and the resulting air quality impacts would vary spatially and temporally during the construction phases.

Operations and Maintenance

Onshore Activities and Facilities

Air emissions: Emissions from onshore O&M activities would be limited to periodic use of construction vehicles and equipment. Onshore O&M activities would include occasional inspections and repairs to the onshore substation and splice vaults, which would require minimal use of worker vehicles and construction equipment. US Wind intends to use port facilities in Ocean City, Maryland, Lewes, Delaware, Hampton Roads area, Virginia, Baltimore (Sparrows Point), Maryland, Hope Creek, New Jersey

and Port of New York/New Jersey to support O&M activities. BOEM anticipates air quality impacts due to onshore O&M from the Proposed Action alone would be minor to moderate, intermittent, and short term.

Offshore and Inshore Activities and Facilities

The Project's WTGs, OSSs, Met Tower, and offshore cables would produce minimal air pollutant emissions during normal operations from accidental releases, vessel emissions, and maintenance and testing. During O&M, air quality impacts are anticipated to be smaller in magnitude compared to construction. Offshore O&M activities would consist of WTG operations, planned maintenance, and unplanned emergency maintenance and repairs. Emergency generators on the WTGs and OSSs are estimated to operate for a maximum of 500 hours per year, during emergencies or testing. Actual operation is expected to be lower, with testing limited to 100 hours per year and remaining hours dependent on the number and duration of emergencies; therefore, emissions from these sources would be small and transient. Pollutant emissions from O&M mostly would be the result of operations of ocean vessels and helicopters used for maintenance activities. Crew transfer vessels and helicopters would transport crews to the Lease Area for inspections, routine maintenance, and repairs. Jack-up vessels, multipurpose offshore support vessels, and rock-dumping vessels would travel infrequently to the Lease Area for significant maintenance and repairs. Table 3.4.1-6 summarizes the Proposed Action's annual offshore emissions during operations. The COP (Volume I, Section 6.1 and Volume II, Appendix C1; US Wind 2024) provides a more detailed description of offshore and onshore O&M activities.

Table 3.4.1-6. Annual O&M emissions (tons)

Period	NO _x	VOCs	CO	PM ₁₀	PM _{2.5}	SO ₂	CO ₂	CH ₄	N ₂ O	CO ₂ e	HAPs
Lifetime (25 years)	5,982	28.7	504.7	42.7	17	2	159,284	0.5	0.1	159,326	4.0

Source: Notice of Intent (NOI) to Submit an Application for an Outer Continental Shelf Air Permit, Appendix A; US Wind 2022
 CH₄ = methane; CO = carbon monoxide; CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; HAP = hazardous air pollutant;
 N₂O = nitrous oxide; NO_x = nitrogen oxide; O&M = operations and maintenance; PM_{2.5} = particulate matter smaller than 2.5 microns; PM₁₀ = particulate matter smaller than 10 microns; SO₂ = sulfur dioxide; VOC = volatile organic compound

The estimated O&M emissions presented in Table 3.4.1-6 are currently under review as part of the OCS air permit submitted to MDE as the permitting authority for US Wind's OCS air permit, which is expected to be issued on or before January 4, 2025. Additionally, air insulated OSSs have a lower risk of gas leaks, larger footprint, and simple maintenance compared to gas insulated switchgears (GIS) systems, which are more compact but have a higher risk of SF6 leaks. While US wind has not completed the design for its proposed onshore substations, this information regarding the type of OSSs will be presented in the FDR/FIR. US wind will also provide the EU ID (voltage strength), a description of the EU and where they will be located, the insulating gas type, and the number of switch gears anticipated to be used. US Wind will apply BACT as required and adopt the appropriate industry best management practices to minimize leaks of SF6 from substation switchgear, if it is used as a coolant. Based on the data in Table 3.4.1-6, BOEM anticipates air quality impacts from O&M of the Proposed Action would be minor to moderate, occurring for short periods of time several times per year during the operation period of 35 years.

Planned activities, including the Proposed Action, are estimated to emit 98.68 tons per year of CO, 418.8 tons per year of NO_x, 12.61 tons per year of PM₁₀, 12.14 tons per year of PM_{2.5}, 4.22 tons per year of SO₂, 7.16 tons per year of VOCs, and 27,862 tons per year of CO_{2e} when all projects are operating. O&M emissions from ongoing and planned activities, including the Proposed Action, could begin in 2024. Emissions would largely be due to the same source types as for the Proposed Action, including commercial vessel traffic, air traffic such as helicopters, and operation of emergency diesel generators. Such activity would result in short-term, intermittent, and widely dispersed emissions.

Anticipated impacts on air quality from O&M emissions would be transient, small in magnitude, and localized. Additionally, some emissions associated with O&M activities could overlap with other projects' construction-related emissions. In summary, the largest magnitude air quality impacts and largest spatial extent would result from the overlapping O&M activities from the multiple offshore wind projects within the air quality geographic analysis area. A net improvement in air quality is expected on a regional scale as wind projects begin operation and offset emissions from fossil fuel sources.

Increased renewable energy production could lead to reductions in emissions from fossil fuel power plants. Table 3.4.1-7 summarizes the emissions avoided as a result of the Proposed Action, based on BOEM's Wind Tool (BOEM 2021), as described in the COP (Volume II, Tables 5-5 and 5-6; US Wind 2024). The avoided CO₂ emissions are equivalent to the emissions generated by about 2.7 million passenger vehicles in a year (USEPA 2020c). Based on the Project design capacity, accounting for construction emissions and assuming decommissioning emissions would be the same, and including emissions from future operations, operation of the Proposed Action would offset emissions related to its construction and eventual decommissioning within different time periods of operation depending on the pollutant; NO_x would be offset in approximately 4 years of operation, PM_{2.5} in 5 months, SO₂ in 1.5 months, and CO₂ in 1.5 months. If emissions from future operations and decommissioning were not included, or if the maximum PDE capacity was assumed, then the times required for emissions to be fully offset would be shorter. From that point, the Project would be offsetting emissions that would otherwise be generated from another source.

Table 3.4.1-7. Avoided emissions (tons) due to Proposed Action operations

Period	NO _x	SO ₂	PM _{2.5}	CO ₂
1,676 MW (Project design capacity)	51,560	80,447	9,245	107,088,323
2,178 MW (maximum PDE capacity)	67,003	104,543	12,014	139,163,704

Source: COP, Volume II, Tables 5-5 and 5-6; US Wind 2024

CO₂ = carbon dioxide; MW = megawatt; NO_x = nitrogen oxide; PDE = Project Design Envelope; PM_{2.5} = particulate matter smaller than 2.5 microns; SO₂ = sulfur dioxide

The potential health benefits of avoided emissions can be evaluated using USEPA’s COBRA health impacts screening and mapping tool as discussed in Section 3.4.1.3. COBRA was used to analyze the avoided emissions that were calculated for the Project (COP, Volume II, Appendix C1; US Wind 2024). Table 3.4.1-8 presents the results of the potential health benefits of avoided emissions.

Table 3.4.1-8. Co-benefits Risk Assessment estimate of avoided health effects with Proposed Action

Discount Rate ¹ (2023)	Monetized Total Health Benefits (million U.S. dollars/year)		Avoided Mortality (cases/year)	
	Low Estimate ²	High Estimate ²	Low Estimate ²	High Estimate ²
3 Percent	7,031,945,799	15,851,494,038	631.129	1,428.890
7 Percent	6,276,280,879	14,135,825,671	631.129	1,428.890

¹ The discount rate is used to express future economic values in present terms. Not all health effects and associated economic values occur in the year of analysis. Therefore, COBRA accounts for the “time value of money” preference (i.e., a general preference for receiving economic benefits now rather than later) by discounting benefits received later (USEPA 2020b).

² The low and high estimates are derived using two sets of assumptions about the sensitivity of adult mortality and non-fatal heart attacks to changes in ambient PM_{2.5} levels. Specifically, the high estimates are based on studies that estimated a larger effect of changes in ambient PM_{2.5} levels on the incidence of these health effects (USEPA 2020b).

The overall impacts of GHG emissions can be assessed using “social costs” of carbon, nitrous oxide, and social cost of methane—together, the “social cost of greenhouse gases” (SC-GHG)—which provide estimates of the monetized damages associated with increases in GHG emissions in a given year. The Council on Environmental Quality (CEQ) is currently updating its 2016 guidance document (CEQ 2016) on consideration of GHGs and climate change under NEPA. On January 9, 2023, CEQ published interim guidance to assist federal agencies in assessing and disclosing climate change impacts during environmental reviews. The interim guidance recommends that agencies provide additional context for GHG emissions through best available social cost of GHG (SC-GHG) estimates for weighing the merits and drawbacks of alternative actions. The SC-GHG estimates that follow are presented for purposes of information and disclosure.

For federal agencies, the best currently available estimates of SC-GHG are the interim estimates of the social costs of CO₂, methane, and nitrous oxide developed by the Interagency Working Group (IWG) on SC-GHG and published in its Technical Support Document (IWG 2021). IWG's SC-GHG estimates are based on complex models describing how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects. One key parameter in the models is the discount rate, which is used to estimate the present value of the stream of future damages associated with emissions in a particular year. The discount rate accounts for the "time value of money," i.e., a general preference for receiving economic benefits now rather than later, by discounting benefits received later. A higher discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (i.e., future benefits or costs are less valuable or are a less significant factor in present-day decisions). IWG developed the current set of interim estimates of SC-GHG using three different annual discount rates: 2.5 percent, 3 percent, and 5 percent (IWG 2021). There are multiple sources of uncertainty inherent in the SC-GHG estimates. Some sources of uncertainty relate to physical effects of GHG emissions, human behavior, future population growth and economic changes, and potential adaptation (IWG 2021).

To better understand and communicate the quantifiable uncertainty, the IWG method generates several thousand estimates of the social cost for a specific gas, emitted in a specific year, with a specific discount rate. These estimates create a frequency distribution based on different values for key uncertain climate model parameters. The shape and characteristics of that frequency distribution demonstrate the magnitude of uncertainty relative to the average or expected outcome.

To further address uncertainty, IWG recommends reporting four SC-GHG estimates in any analysis. Three of the SC-GHG estimates reflect the average damages from the multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3 percent annual discount rate for future economic effects. This is a low-probability but high-damage scenario and represents an upper bound of damages within the 3 percent discount rate model. The estimates below follow the IWG recommendations.

Table 3.4.1-9 presents the SC-GHG associated with estimated emissions from the Proposed Action. These estimates represent the present value of future market and nonmarket costs associated with CO₂, methane, and nitrous oxide emissions. In accordance with IWG's recommendation, four estimates were calculated based on IWG estimates of social cost per metric ton of emissions for a given emissions year and US Wind's estimates of emissions in each year. In Table 3.4.1-9, negative values represent social benefits of avoided GHG emissions. The negative values for net SC-GHG indicate that the impact of the Proposed Action on GHG emissions and climate would be a net benefit in terms of SC-GHG.

Table 3.4.1-9. Estimated social cost of greenhouse gases (2020 U.S. dollars) associated with the Proposed Action

Description	Average Value, 5% Discount Rate	Average Value, 3% Discount Rate	Average Value, 2.5% Discount Rate	95 th Percentile Value, 3% Discount Rate
Construction, Operation, and Build-outs ^{a,b}	\$8,435,000	\$33,0528,000	\$50,4491,000	\$100,397,000
Avoided Emissions ^{a,b,c}	-\$1,080,958,000	-\$4,255,053,000	-\$6,485,552,000	-\$12,994,112,000
Net SC-GHG ^c	-\$1,072,523,000	-\$4,222,001,000	-\$6,435,104,000	-\$12,893,716,000

CO₂ = carbon dioxide; GHG = greenhouse gas; IWG = Interagency Working Group; SC = social cost

Estimates are the sum of the social costs for all applicable GHGs over the project lifetime as estimated through IWG's recommendations. Costs are rounded to the nearest \$1,000.

^a The following calendar years were used in calculating SC-GHG: construction 2024–2027, operation (25 years) 2028–2049, build-outs 2050, and decommissioning 2050. Note that 2050 is the last available year for calculations per IWG's recommendation. Avoided emissions were calculated through the operating time frame of the project.

^b CO₂ provides more than 99 percent of total GHG emissions, which are primarily from combustion. Avoided emissions, which are also primarily from combustion, are also assumed to be predominantly from CO₂. As a result, the social costs of methane and nitrous oxide would be negligible. The social costs listed in this table therefore reflect all GHG components but are assumed to be almost entirely associated with CO₂.

^c Negative cost values indicate benefits.

Climate change: The Proposed Action would produce GHG emissions that contribute to climate change; however, the contribution would be less than the emissions reductions from fossil fuel sources during operation of the Project. Because GHG emissions disperse and mix within the troposphere, the climatic impact of GHG emissions does not depend on the source location. Therefore, regional climate impacts are largely a function of global emissions. Nevertheless, the Proposed Action would have negligible impacts on climate change during these activities and minor beneficial impacts on criteria pollutant and O₃ precursor emissions as well as GHGs, compared to a similarly sized fossil fuel power plant or to the generation of the same amount of energy by the existing grid.

Conceptual Decommissioning

The impacts of onshore and offshore Project decommissioning on air quality would be similar to—and would have similar or lower impact magnitudes as—the impacts described for construction.

Decommissioning would require similar types of onshore and offshore vessel and vehicle emissions and port usage. Emissions during decommissioning could be lower than construction if cables are retired in place rather than removed. Therefore, impacts of Proposed Action decommissioning would range from negligible to moderate.

3.4.1.5.2 Cumulative Impacts of the Proposed Action

Construction and Installation

Air emissions: In the context of reasonably foreseeable environmental trends, the Proposed Action would contribute a noticeable amount to air quality impacts from ongoing and planned activities, including offshore wind associated with onshore construction, which would be minor to moderate.

Emissions from ongoing and planned activities, including the Proposed Action, would be highly variable and limited in spatial extent at any given period. Fugitive particulate emissions would vary depending on the spatial extent of the excavated areas, soil type, soil moisture content, and magnitude and direction of ground-level winds. Impacts would be greatest during overlapping construction activities, but these effects would be short term as the overlap in the air quality geographic analysis area would be limited in time.

Operations and Maintenance

Air emissions: While operation of offshore wind projects would contribute small amounts of CO₂ emissions, these emissions would be minimal compared to ongoing and reasonably foreseeable activities other than offshore wind. The Proposed Action would contribute a minimal amount to the combined adverse GHG impacts on air quality from ongoing and planned activities, including offshore wind, and would contribute a substantial amount of beneficial impacts from the net decrease in GHG emissions due to the displacement of emissions from fossil fuel power plants. In the context of reasonably foreseeable environmental trends, the change in GHG emissions from Proposed Action operations would have negligible adverse and minor beneficial impacts on GHG emissions.

Conceptual Decommissioning

Air emissions: Proposed Action decommissioning would contribute a small amount to the cumulative combined air quality impacts from ongoing and planned activities, including offshore wind. In the context of reasonably foreseeable environmental trends, the air quality impacts of decommissioning of the Proposed Action and other ongoing or planned activities would be short term and range from negligible to moderate.

3.4.1.5.3 Conclusions

Impacts of Alternative B – Proposed Action. The Proposed Action would result in a net decrease in regional emissions compared to the installation of a traditional fossil fuel power plant. Although there would be some short-term air quality impacts due to various activities associated with construction, O&M, and eventual decommissioning, these emissions would be relatively minimal in comparison to the avoided emissions from the Proposed Action. The Proposed Action would result in air quality-related health effects avoided in the region due to the reduction in emissions associated with fossil fuel energy generation. As described earlier, the impact from air pollutant emissions is anticipated to be minor to moderate, and the impact from accidental releases would be negligible. Considering all IPFs together, Proposed Action construction, O&M, and decommissioning would have **minor to moderate** adverse air quality impacts and **minor to moderate beneficial** impacts, to the extent that energy produced by the Project would displace energy produced by fossil fuel power plants. Per Tables 3.4.1-5, 3.4.1-6, and 3.4.1-7, the estimated impact on air quality from the Proposed Action is less than 1% of the avoided emissions. Measures to reduce or avoid emissions during Proposed Action activities would include using low-sulfur fuels and specific engines designed to reduce air pollution to the extent practicable, limiting engine idling times in compliance with international air emission standards for marine vessels, and using engines with add-on emission controls where practicable (COP, Volume II, Section 5.3; US Wind 2024).

BMPs listed in EPA's Clean Construction guidance will be implemented where practicable to reduce impacts of the project during construction. Measures to replace outdated engine components, install emission reduction technology where feasible (based on cost and procurement), maintain regular maintenance, and replace older equipment where feasible (based on cost and procurement) will be implemented during the construction portion of the project. Due to the relatively small volume of emissions from Proposed Action activities, the fact that emissions would be spread out in time (4 years for construction and then lower annual emissions during operation), and the large geographic area over which emissions would be dispersed (throughout the 80,000-acre [32,374.9-hectare] Lease Area, the Offshore Export Cable Route, and the vessel routes between ports and onshore facilities), air pollutant concentrations associated with the Proposed Action are not expected to exceed the NAAQS.

Cumulative Impacts of Alternative B – Proposed Action. In the context of other reasonably foreseeable environmental trends in the area, cumulative impacts on air quality from ongoing and planned activities, including those contributed by the Proposed Action would range from undetectable to noticeable, with noticeable beneficial impacts. BOEM anticipates the overall cumulative impacts associated with the Proposed Action when combined with the impacts from past, present and reasonable future activities, including offshore wind, would result in **minor to moderate** adverse impacts and **minor to moderate beneficial** impacts. The main driver for the adverse impact rating is emissions related to construction activities increasing commercial vessel traffic, air traffic, and truck and worker vehicle traffic. Combustion emissions from construction equipment and fugitive emissions would be higher during overlapping construction activities but short term in nature, as the overlap would be limited in time. Therefore, the adverse impact on air quality would likely be minor to moderate because while emissions would increase ambient pollutant concentrations, they are not expected to exceed the NAAQS. The Proposed Action and other offshore wind projects would benefit air quality in the region surrounding the projects to the extent that energy produced by the projects would displace energy produced by fossil fuel power plants. While the benefit is regional, BOEM anticipates a minor to moderate beneficial impact because the magnitude of the potential reduction in emissions from displacing fossil fuel power generation would be small relative to total energy generation emissions in the area.

3.4.1.6 Impacts of Alternatives C, D, and E on Air Quality

3.4.1.6.1 Impacts of Alternatives C, D, and E

The impacts associated with the Proposed Action (as described in Section 3.4.1.5) would not change substantially under the other action alternatives. Alternatives C-1 and C-2 would include an Onshore Export Cable Route from the landfall and avoid installation of a cable crossing Indian River Bay and Indian River (Inshore Export Cable Route). Alternative C-2 could have a longer Offshore Export Cable Route. Thus, Alternative C is anticipated to have the same emissions as the Proposed Action because the number of WTGs are the same. Alternatives D and E could have marginally lower impacts due to the reduced number of installed WTGs, OSSs, and cables. Alternative D would exclude up to 32 WTGs and 1 OSS, resulting in a 36 percent reduction in expected annual energy production and a 26 percent reduction in annual construction and O&M emissions, equivalent to 1.7 million passenger vehicles removed annually. The emissions reduced from excluding one OSS (loss of a generator and a switchgear

(SF₆ leakages) would be minuscule and are excluded from this assessment. Alternative E would exclude up to 11 WTGs, resulting in a 9.89 percent reduction in expected annual energy production and a 9.1 percent reduction in annual construction and O&M emissions, which is equivalent to 2.1 million passenger vehicles removed annually.

These differences across the various Alternatives would not change the impact ratings compared to Alternative B and would remain minor to moderate adverse and minor to moderate beneficial.

3.4.1.6.2 Cumulative Impacts of Alternatives C, D, and E

Impacts of Alternatives C, D, and E when combined with impacts from reasonable future trends, ongoing and planned activities, including other offshore wind activities, would not change from the Proposed Action and would remain **minor to moderate** adverse and **minor to moderate beneficial**.

3.4.1.6.3 Conclusions

Impacts of Alternatives C, D and E. While the action alternatives would have marginally different impacts, they would have the same impact magnitudes as Alternative B. As a result, the impacts of the action alternatives would likely remain the same as Alternative B: **minor to moderate** adverse and **minor to moderate beneficial**.

Cumulative Impacts of Alternatives C, D and E. In the context of other reasonably foreseeable environmental trends in the area, cumulative impacts on air quality from ongoing and planned activities, including those contributed by Alternatives C, D and E would occur under the same scenario (Appendix D, *Planned Activities Scenario*) as Alternative B. As stated earlier, the action alternatives would have the same impact magnitudes as Alternative B. Therefore, the overall impact of the action alternatives on air quality when combined with past, present, and reasonably foreseeable activities would be **minor to moderate** adverse and **minor to moderate beneficial**.

3.4.1.7 Comparison of Alternatives

Impacts of Alternatives. Table 3.4.1-10 compares the GHG emissions based off the generation capacity and the capacity factor from the No Action Alternative, the Proposed Action, and the action alternatives. GHG emissions were calculated using the BOEM Tool. Version 2.0 of the BOEM Tool uses marginal emission factors from EPA's AVERT to estimate avoided emissions in the AVERT region where the user-defined offshore wind project will plug into the landside power grid.

Table 3.4.1-10. GHG emissions from the No Action Alternative, the Proposed Action, and the action alternatives

Annual Emissions (U.S. tons)	Construction (Total CO ₂ e Emissions)	Operations (Annual CO ₂ e Emissions) ¹	Operations (Avoided Annual CO ₂ Emissions) ²	Operations (Annual Net CO ₂ e Emissions)	Operations (Lifecycle Net CO ₂ e Emissions)
Alternative A (No Action)	370,372	22,330	5,770,840	-5,378,138	-143,712,750
Alternative B (Proposed Action)	459,675	28,703	11,337,388	-10,849,010	-271,225,250
Alternative C	495,675	28,703	11,337,388	-10,813,010	-282,738,150
Alternative D	436,456	27,046	8,389,667	-7,926,165	-198,154,125
Alternative E	451,548	28,123	10,305,686	-9,826,015	-245,650,375

CO₂ = carbon dioxide; CO₂e = carbon dioxide equivalent; GHG = greenhouse gas; U.S. = United States

¹ Operation emissions under the No Action alternative assume that the concurrent projects will operate under the same time frame (25 years) as the Proposed Action alternative.

² Avoided emissions only include CO₂ and do not include other GHGs (e.g., methane [CH₄], nitrous oxide [N₂O]). GHG emissions are from fuel combustion. For construction and operations, CO₂ makes up more than 99 percent of the CO₂e emissions.

A similar GHG makeup is expected for avoided emissions.

As described in Section 3.4.1.5, the impacts of the Proposed Action, in combination with ongoing and planned activities, would likely be slightly larger than but would have similar impact magnitudes as the No Action Alternative. The Proposed Action would impact air quality primarily through air emissions and climate change. Under the No Action Alternative, these impacts would not occur. The annual GHG emissions reductions achieved by implementation of the No Action Alternative would be equivalent to the energy usage from about 725,000 homes. Under the Proposed Action and other alternatives, the annual GHG emissions reductions would be equivalent to energy usage by 1,430,000 homes.

As stated in Section 3.4.1.6, compared to Alternative B, the action alternatives would have different impacts on air quality. These differences notwithstanding, the impacts of the action alternatives would likely remain the same as Alternative B: **minor to moderate** adverse and **minor to moderate beneficial** impacts on air quality.

Cumulative Impacts of Alternatives. In the context of other reasonably foreseeable environmental trends in the area, cumulative impacts on air quality from ongoing and planned activities, including those contributed by the action alternatives would also be the same as Alternative B: **minor to moderate** adverse and **minor to moderate beneficial**.

If BOEM requires the mitigation measures beyond the design features described in Section 3.4.1.5, then adverse Project impacts on air quality could be further reduced and beneficial impacts could be increased; however, overall impact magnitudes would remain the same as described in this section.

3.4.1.8 Proposed Mitigation Measures

No additional measures to mitigate impacts on air quality have been proposed for analysis. Additional mitigation measures may be identified after publication of this document, through the OCS Air Permitting process during the best available control technology and modeling processes. US Wind would be required to comply with all permit requirements identified in the OCS Air Permit.

3.4.2 Water Quality

The reader is referred to Appendix F, *Impact-Producing Factor Tables and Assessment of Water Quality; Bats; Birds; Sea Turtles; Wetlands and Other Waters of the United States; Demographics, Employment, and Economics; and Land Use and Coastal Infrastructure* for a discussion of current conditions and potential impacts on water quality from implementation of the No Action Alternative, the Proposed Action, and other action alternatives.

3.5 Biological Resources

3.5.1 Bats

The reader is referred to Appendix F, *Impact-Producing Factor Tables and Assessment of Water Quality; Bats; Birds; Sea Turtles; Wetlands and Other Waters of the United States; Demographics, Employment, and Economics; and Land Use and Coastal Infrastructure* for a discussion of current conditions and potential impacts on bats from implementation of the No Action Alternative, the Proposed Action, and other action alternatives.

3.5.2 Benthic Resources

This section discusses potential impacts on benthic resources—other than fishes and commercially important benthic invertebrates—from the Project, action alternatives, and ongoing and planned activities in the geographic analysis area. The benthic resources geographic analysis area (Figure 3.5.2-1) includes a 10-mile (16.1-kilometer) radius/buffer around the Lease Area and a 330-foot (100.6-meter) buffer extending from the edge of the Offshore Export Cable Route. The geographic analysis area is based on where the most widespread impact (i.e., suspended sediment) from the Project could affect benthic resources. This area would account for transport of water masses and for benthic invertebrate larval transport due to ocean currents. Although sediment transport beyond 10 miles (16.1 kilometers) is possible, sediment transport related to Project activities would likely be on a smaller spatial scale. Finfish, invertebrates of commercial or recreational value, and essential fish habitat (EFH) are addressed in Section 3.5.5. Commercial fisheries and for-hire recreational fishing are addressed in Section 3.6.1.

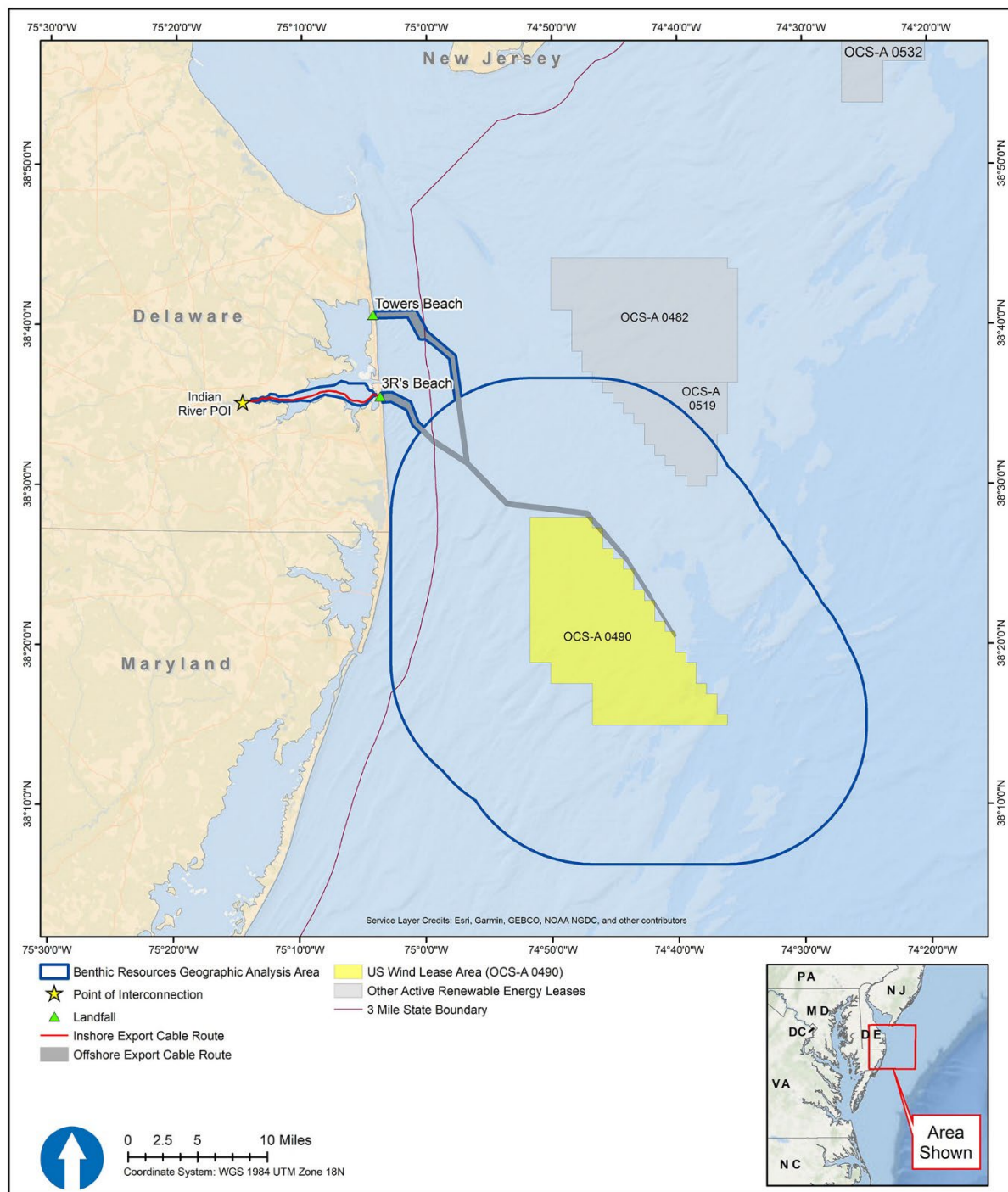


Figure 3.5.2-1. Benthic resources geographic analysis area