RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF THE DIRECTOR
235 Promenade Street, Room 425
Providence, Rhode Island 02908

June 11, 2021

Program Manager
Office of Renewable Energy
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

RE: Docket No. BOEM–2021–0029: Notice of Intent to Prepare an Environmental Impact Statement for Revolution Wind LLC's Proposed Wind Energy Facility Offshore Rhode Island

Dear Program Manager,

The Rhode Island Department of Environmental Management (RIDEM) supports offshore wind energy development to mitigate the impacts of climate change and reduce greenhouse gas emissions. The Revolution Wind Farm will provide the State of Rhode Island with 400 MW of clean, renewable energy, contributing to the State's goal of meeting 100% of electricity demand with renewable energy by 2030. The project's power purchase agreement with the Narragansett Electric Company d/b/a National Grid was approved by the Rhode Island Public Utilities Commission on May 28, 2019.

RIDEM is committed to ensuring that the local and regional environmental and socioeconomic impacts of offshore wind development are minimized. As part of RIDEM's effort to enable offshore wind energy development while mitigating any adverse impacts, the agency has reviewed the Notice of Intent (86-FR-22972; BOEM–2021–0029) and associated Ørsted Construction and Operations Plan (COP) for the Revolution Wind Farm.

The Revolution Wind Farm is a proposed 704 MW offshore wind farm situated on submerged lands of the Outer Continental Shelf in Bureau of Ocean Energy Management (BOEM) lease area OCS-A 0486. It will provide 400 MW of electricity to Rhode Island, and 304 MW to Connecticut. It will be located between Montauk, New York and Martha's Vineyard in

Massachusetts, approximately fifteen miles south of the Rhode Island Coast. The project is situated within the Rhode Island Coastal Resources Management Council (CRMC) 2011 geographic location description (GLD) approved by the National Oceanic and Atmospheric Administration (NOAA) Office of Coastal Management and coincident with the CRMC Ocean Special Area Management Plan (Ocean SAMP) study area boundary. As an applicant seeking a federal license or permit in federal waters within the CRMC 2011 GLD, Revolution Wind must be consistent with the CRMC's enforceable policies, pursuant to 15 CFR Part 930, Subpart E.3.

The RIDEM has reviewed the Revolution Wind COP and offers the following comments to the BOEM regarding the project and preparation of a Draft Environmental Impact Statement (DEIS):

General Comments

- Through the National Environmental Policy Act permitting process, RIDEM suggests that BOEM require the following of the developer:
    - Work with the Rhode Island commercial and recreational fishing industries to minimize impacts to fishing activities and the biological resources on which they rely to the greatest extent possible and offer appropriate mitigation plans in the event that adverse impacts cannot be avoided.
        - Mitigation plans should be developed with substantial input from the Rhode Island Fishermen's Advisory Board (FAB) and the CRMC.
    - Conduct comprehensive fisheries resource monitoring surveys consistent with the recommendations outlined by the Responsible Offshore Science Alliance (ROSA): https://4d715fff-7bce-4957-b10b-aead478f74f6.filesusr.com/ugd/99421e_b8932042e6e140ee84c5f8531c2530ab.pdf .
        - These surveys should address concerns related to biological impacts associated with pile driving and operational noise, habitat loss and creation, sedimentation, electromagnetic fields, and cumulative impacts.
    - Commit to conducting high resolution benthic habitat characterization and avoiding areas of sensitive benthic habitats when possible. These habitats provide refuge and structure for juvenile fish and invertebrates, as well as spawning areas for adult life history stages.
        - The NOAA Greater Atlantic Regional Fisheries Office recently developed benthic habitat mapping recommendations to better inform Essential Fish Habitat consultations: https://media.fisheries.noaa.gov/2021-03/March292021_NMFS_Habitat_Mapping_Recommendations.pdf?null. These recommendations should be followed to ensure avoidance of sensitive habitats.
    - Support NOAA's efforts to minimize impacts to, or adapt, fish, invertebrate, and marine mammal monitoring surveys in and around the wind energy area, as well as along the cable route. These surveys provide some of the primary data used for

    informed fisheries and wildlife management decisions, and disruptions to such long-term monitoring efforts will introduce additional uncertainty into stock assessments and population monitoring.
  - Minimize impacts to birds, sea turtles, and marine mammals, especially the critically endangered North Atlantic right whale (*Eubalaena glacialis*).
    - Impact minimization may occur through, but is not limited to, construction time of year restrictions and exclusion zones, vessel speed restrictions (applied to all vessels associated with the wind farm), and noise mitigation measures. Sound scientific data collection and monitoring of the wind energy area is also essential to evaluating potential effects in real-time to enable implementation of adaptive management measures.
- Anadromous species impacts
  - The RIDEM Division of Fish and Wildlife prohibits any in-stream work from March 1 to July 1 to protect the in-migration of anadromous species including alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), and American shad (*Alosa sapidissima*). While the project does not include work in-stream, construction along the export cable corridor has the potential to affect fish staging to enter the riverine systems during their migration. With this in mind, the Division of Fish and Wildlife recommends that work through this corridor does not take place from February 15 through July 1 to allow the anadromous migrations to take place unimpeded. The Division also limits in-stream work during juvenile out-migrations from September 15 until November 15. However, if the project can demonstrate there will be no entrapment or entrainment of juvenile out-migrants, the Division may reconsider its fall restriction during application review.
- Project design
  - Up to 100 wind turbine generators (WTGs) with monopile foundations at 8-12 MW each
    - Turbines larger than 12 MW will be available by the time of construction (e.g., Vineyard wind has already committed to turbines larger than 12 MW). If possible, the developer should consider using a larger turbine and reducing the number of foundations within the wind farm. This will reduce the area of benthic disturbance and the amount of pile driving.
  - Turbines in a 1 x 1 NM grid layout in alignment with abutting lease areas
    - The DEM is supportive of this approach in an effort to improve safety and fishability of the windfarm.
    - This is in accordance with the recommendations of the United States Coast Guard (The Areas Offshore of Massachusetts and Rhode Island Port Access Route Study:

    - https://www.navcen.uscg.gov/pdf/PARS/FINAL_REPORT_PARS_May_14_2020.pdf)
  - Cable route situated within the currently proposed CRMC cable corridor (650-RICR-20-00-1.3.1(S))
    - The developer has already consulted with RIDEM to ensure that the proposed route avoids long-term fisheries resource monitoring sites for RIDEM and the University of Rhode Island.
  - Two alternating current (AC) export cables at 4-6 ft. burial depth
    - Up to 25 miles in federal waters and 23 miles in Rhode Island state waters
    - Efforts should be made to avoid not achieving target burial depth to minimize impacts to fishing activities within the cable route. In the event that a cable cannot be buried to 4 ft., or is located at a crossing with existing cables, and mattressing is installed, all cable mattress locations should be made available to the public and mattressing should be designed to limit the creation of new fishing 'hangs'.
  - Horizontal directional drilling (HDD) at Quonset landfall
    - This cable installation method is preferred by RIDEM staff over other installation techniques (e.g., open cut, jet plowing).

COP Section-specific Comments

Section 4.2.2.1-Affected Environment

- Seafloor disturbance, sediment suspension, and deposition in Rhode Island state waters will all be reviewed in greater detail through the RIDEM permitting process for a Water Quality Certification (RIGL § 46-12-3 and 250-RICR-150-05-1.1 *et seq.* - federal authority delegated to the State pursuant the Clean Water Act [CWA], 33 U.S.C. §§ 1341-1342) and a Dredge Permit (pursuant to the Rules and Regulations for Dredging and the Management of Dredged Materials - 250-RICR-150-05-2.1 *et seq*.).

Biological Resources

Section 4.3.2-Benthic and Shellfish Resources

- Construction and decommissioning of offshore wind farms may lead to loss of sediment and consequently, loss of habitats. During any construction, local water turbidity may increase, as suspended solids and contaminants within the sediments may be mobilized and transported by prevailing water movements.
  - These mobilized sediments may also smother neighboring habitats of sessile species, as well as the living organisms themselves (Gill 2005).
  - Suspended sediment poses a threat to fish within the construction area, as it may physically clog their gills and limit oxygen intake (Lake and Hinch 1999). Larval states are more vulnerable than adult life history stages due to more limited

    - mobility, as well as larger gills and higher oxygen consumption in proportion to body size (Auld and Schubel 1978; Partridge and Michael 2010).
    - Sediment dispersal may also smother eggs and benthic suspension feeders by clogging the feeding or respiratory apparatus. Some benthic epifauna and deep-burrowing infauna may also be unable to escape burial by displaced sediment. While sedimentation events are generally brief, seabed communities may be greatly altered and take years to recover (Maurer et al. 1986).
- The RODEO study of the benthic habitat changes at the BIWF documented heavy colonization of the turbine structures by blue mussels three years post construction, demonstrating changes in the dominant biota. Black sea bass were found in large numbers and appeared to benefit from added structure (Hutchison et al. 2020).
    - The study also found that the BIWF did not demonstrate the same strong vertical epifaunal zonation as observed on European farms. This may suggest that after three years, the habitat is still in a successional state and additional monitoring is needed to document the final successional stage (Hutchison et al. 2020). As such, longer benthic assessments should be conducted on projects moving forward.
- Soft sediments are generally preferred for wind farm development, as hard substrates may create challenges in turbine foundation and transmission cable installation.
    - Grabowski et al. (2014) suggest that soft sediment habitats have an inherent ability to recover more rapidly from anthropogenic impacts than other substrates. However, Henriques et al. (2014) contend that this is not appropriate logic to develop such areas due to the high number of affected species and possible consequences of impacts on those species for ecosystem structure and function (Grabowski et al. 2014; Henriques et al. 2014).

Section 4.3.4-Marine Mammals

- In late December of 2020, NOAA Fisheries issued a proposed rule amending the Atlantic Large Whale Take Reduction Plan in an effort to limit the serious injury and mortality (SIM) to fin whales, humpback whales, and the critically endangered North Atlantic right whale. Thirty-one North Atlantic right whales have been found dead and another ten have been seriously injured in U.S. waters since 2017. Vessel speed restriction zones have been implemented to avoid ship strikes and wind projects have committed to pile driving restrictions to minimize impacts.
    - The proposed regulations aim to achieve a 60% reduction in (SIM) by: 1) reducing the number of vertical lines in fixed gear fisheries, 2) enacting seasonal area closures for fishing activities with buoy lines, 3) gear modifications to include weak vertical lines or lines with weak inserts, and 4) enhanced gear marking requirements. Therefore, the commercial lobster and Jonah crab fishery as well as additional fixed gear fisheries may have to make substantial modifications to fishing activities.

- As previously mentioned, all efforts to further reduce impacts to marine mammals should be taken, with additional consideration for how impacts to whales may also affect existing ocean uses including fishing.

Section 4.3.3-Finfish and Essential Fish Habitat

- Revolution Wind is located within essential fish habitat for approximately thirty-three (33) species of interest to the region: longfin inshore squid, Atlantic mackerel, bluefish, Atlantic butterfish, spiny dogfish, ocean quahog, summer flounder, scup, black sea bass, albacore tuna, bluefin tuna, blue shark, basking shark, common thresher shark, sandbar shark, skipjack tuna, shortfin mako shark, white shark, yellowfin tuna, sand tiger shark, Atlantic sea scallop, little skate, ocean pout, Atlantic herring, Atlantic cod, red hake, silver hake, yellowtail flounder, monkfish, windowpane flounder, winter skate, winter flounder, white hake, and pollock (NOAA 2018). Each of these species requires RI/MA WEA habitat at some stage in their life history. The construction phase is the most likely to have negative effects on fish and habitat.
- Of primary concern is construction noise, particularly acoustic energy generated by pile driving operations. High sound levels can physically damage the inner ear sensory cells of fish, as well as cause fish hearing loss (threshold shifts), elicit stress responses, and alter their behavior. The extent of impacts will vary by species and depend on the exposure sound level and duration (Popper et al. 2003). Fish with swim bladders appear to be more susceptible to pile driving noise (Mooney et al. 2020).
    - For example, for one species of particular cultural and economic value, Atlantic cod, noise of frequencies from 100-1000 hertz has been found to reduce reproductive output (Sierra-Flores et al. 2015).
    - Operational phase noise is not likely to cause permanent damage, but it may mask communication in some fish species (Wahlberg and Westerberg 2005). This remains one of the least studied areas of wind farm noise impacts (Mooney et al. 2020).
    - In the context of anthropogenic noise, it is important to consider invertebrates separately from vertebrates; invertebrates (e.g., mollusks) hear in a different manner than vertebrates due to their nervous system structure and hearing organs. Their hearing organs, statocysts, work by detecting particle motion instead of sound pressure (Stocker 2002).
        - Unfortunately, most previous studies evaluating wind farm noise have measured sound pressure rather than particle motion. Therefore, there is a limited understanding of how invertebrates are affected by construction or operation phase sound. In fact, Mooney et al. (2020) contend that more research is needed for most invertebrate species and life history stages before anything can be argued with any degree of certainty.

        - There may be negative impacts in close proximity to the project, as de Soto et al. (2013) suggest that routine anthropogenic noise already decreases recruitment of scallop larvae in wild stocks (Madsen et al. 2006).
        - Jones et al. (2020) determined that longfin squid exhibited a startle response to pile driving noise in a lab setting but they habituated quickly in the short term. 24 hours later, the squid were re-sensitized to the noise.
- Most previous studies on electromagnetic fields have focused on direct current (DC) cables, while the cables proposed in the U.S. have all been alternating current (AC). DC and AC cables should not be considered comparable, as fish may perceive static and alternating magnetic fields differently (Rommel and McCleave 1973a).
    - Species of elasmobranchs like smooth dogfish and blue sharks, as well as other fish including sea lamprey, American eels, and Atlantic salmon are all thought to be able to sense electric fields at low levels (Heyer et al. 1981; Kalmijn 1982; Rommel and McCleave 1973b).
    - It is presently unknown whether behavioral changes will result from detected AC electromagnetic fields, though behavioral responses of American lobster and little skates were documented in response to DC electromagnetic fields emitted by two high-voltage DC cables. Researchers noted a striking increase in foraging/exploratory behavior in skates, and a more subtle exploratory response in lobsters in response to the cables (Hutchison et al. 2018; Hutchison et al. 2020).
    - The impacts of induced electromagnetic fields are expected to be greater for cartilaginous fish because they use electromagnetic signals to detect their prey (Bailey et al. 2014; Gill 2005; Gill and Kimber 2005; Bergstrom et al. 2014).
    - Other fish may also be affected by interference with their capacity to orient in relation to the geomagnetic field; potentially disturbing fish migration patterns (Metcalf et al. 2015). Habitat disruption and/or loss is another possible outcome of offshore wind development.
- Offshore wind developments may offer benefits to certain fish and invertebrate species by creating artificial reefs. The turbine foundations may serve as artificial reef structures and increase the amount of hard substrate for recruitment following the construction disturbance (Petersen and Malm 2006). This artificial reef effect has been documented on past wind farms, with new habitat provided by the added hard structures. The reef effect can affect ecosystem structure and functioning due to colonization by suspension feeders, which deposit fecal matter on the seafloor, increasing food availability (Degraer et al. 2020).
    - Increased habitat complexity may in turn result in increased biodiversity and biomass (Inger et al. 2009; Gill 2005; Linley et al. 2007). Wilson and Elliot (2009) suggest that the potential for habitat creation may even be regarded as compensation for the habitat lost.

    - However, new habitat created by the turbine foundations may not benefit all species that utilized the local habitat prior to construction (e.g., one offshore wind farm assemblage composition of epibiota and motile invertebrates was significantly different from that of adjacent hard substrate; Wilhelmsson and Malm 2008).
    - There is also a question of whether the artificial reef effect at wind farms results in increased productivity, or rather a redistribution of existing biomass (attraction). Mavraki et al. (2021) found that Atlantic cod in European wind farms were consuming fouling organisms, suggesting that productivity may have been increased; however, further research is needed.
- As noted in section 4.2.3.1, a portion of the RWF lease area intersects with Cox Ledge, an area known to support Atlantic cod spawning activities.
    - Efforts should be made to avoid turbine placement, and construction in close proximity to Cox Ledge, and any areas of complex benthic habitat in general.
    - The full spatial and temporal extent of southern New England Atlantic cod (*Gadus morhua*) spawning is poorly understood, as many long-term scientific surveys do not provide the spatial and temporal resolution needed to properly characterize the distribution of cod spawning activity (DeCelles et al. 2017). However, the presence of spawning aggregations of cod in southern New England waters, including south of Rhode Island, has been documented through various sources (Zemeckis et al. 2014a). Cod have historically been managed as two units: the Gulf of Maine and the Georges Bank management units (McBride and Smedbol 2020), both of which are currently in a critically depleted state (NEFSC 2017a, NEFSC 2017b). Although managed as two broad stocks, the management units are believed to have finer scale structure within that support metapopulations. This metapopulation structure is likely critical in supporting the overall stock. Such metapopulation and heterogeneity characteristics are important to identify, as mismatches between management units and stock structure can reduce the effectiveness of management measures. Further, the connectivity between stocks and metapopulations is important to account for to better understand a stock's resiliency to various natural and fishing mortality pressures. For example, it has been suggested that cod spawning components in the Great South Cannel, Nantucket Shoals, southern New England and the Mid-Atlantic are more connected (genetically and in terms of larval dispersal) with spawning components in the Gulf of Maine than those on eastern Georges Bank, the unit with which they are currently managed with (Zemeckis et al. 2014a).
    - The Atlantic Cod Stock Structure Working Group (ACSSWG), a group of scientific experts convened by the Northeast Fisheries Science Center and the New England Fishery Management Council, recently conducted a peer-reviewed analysis of U.S. Atlantic cod to evaluate the scientific support for alternative

    biological stock structure scenarios, and identified a series of mismatches: 1) phenotypic and genetic heterogeneity suggesting that cod are not mixed within management units, 2) extensive movements between management units, and 3) dispersal of larvae around Cape Cod from the Gulf of Maine unit to the Georges Bank unit (McBride and Smedbol 2020). The ACSSWG concluded that there are likely more than two stocks of Atlantic cod, highlighting the need for improved science on a fine scale spatial structure for this species.
    - Of these newly proposed management units, a separate southern New England (SNE) stock (represented as NOAA Statistical Areas 537, 538 and 539) is included. The ACSSWG recently hosted an assessment workshop specific to the SNE and Georges Banks stocks on Tuesday June 1, 2021. Within the SNE region is Cox Ledge, a known spawning site for Atlantic cod (e.g., Kovach et al. 2010; Zemeckis et al. 2014a). Spawning is known to occur within the Cox Ledge area between late fall/early winter (Nov-Jan) and late winter/early spring (Feb-Apr), which some suggest represents a single metapopulation unique to this area. As cod return to specific spawning grounds annually in the northwest Atlantic, Cox Ledge may be unique and important to the southern New England Atlantic cod metapopulation.
    - While the southern New England region has not sustained the cod biomass of other units within United States waters, Atlantic cod have supported significant recreational and commercial fisheries that are important to coastal communities, especially in Rhode Island (Serchuk and Wigley 1992; Oviatt et al., 2003). Climate change is anticipated to hinder Atlantic cod stock rebuilding, but recreational angler accounts suggest that abundance of cod south of Rhode Island has increased significantly over the past 15 years (Sheriff 2018). Therefore, Cox Ledge may be very important for effective stock rebuilding given the unique habitat of the area and potential significance in spawning. Early life history stages of Atlantic cod need complex benthic habitats, specifically boulder, cobble, and pebble substrates, like that of Cox Ledge (NOAA 1999). Moreover, cod exhibit site fidelity (Zemeckis et al. 2017) and spawning aggregations are sensitive to disturbance (Dean et al. 2012). Langan et al. (2019) suggest that eggs and larvae spawned near Cox Ledge may settle in Narragansett Bay based on larval cod observations in the Bay and their estimated hatching dates. Zemeckis et al. (2014b) suggest that spawning closures could be used as part of a multidisciplinary approach to fisheries management to prevent the disruption of spawning activity and the extirpation of semidiscrete spawning components.
- The RIDEM looks forward to reviewing proposed fisheries resource monitoring survey designs associated with the Revolution Wind Farm.
    - Findings from past wind farm assessments demonstrate the challenge with large variances in catch over time and resulting low statistical power (Carey et al.

    2020). As such, survey proposals should include a preliminary power analysis demonstrating that the proposed design will achieve a minimum of 80% statistical power (see Cohen 1988). However, higher power levels, with low effect sizes should be targeted. Both power and effect size should be discussed with the FAB prior to survey implementation.
    - Efforts should also be made to use shared sampling methods with other wind development surveys and existing fisheries surveys.
    - Please refer to the ROSA recommendations (linked above) for additional details on fisheries monitoring survey design considerations.

Section 4.3.8 - Sea Turtles

- Four species of sea turtles regularly inhabit Rhode Island and Massachusetts coastal waters in the summer and fall, all of which are protected under the U.S. Endangered Species Act. The green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead (*Caretta caretta*) sea turtles use these areas for migration and foraging. A fifth species, the hawksbill sea turtle (*Eretmochelys imbricata*) is a less frequent visitor, but also protected under the U.S. Endangered Species Act.
- Underwater noise, project construction, vessel traffic, and discharge of debris and spills have potential to adversely impact these species, especially during the construction phase of the project. Furthermore, sea turtles use magnetic sensitivity for orientation and navigation. Potential behavioral changes to sea turtle navigation due to the AC electromagnetic fields associated with buried electrical cables are poorly understood at this time.

<u>Social and Economic Resources</u>

Section 4.6.5-Commercial and Recreational Fishing

- The developer has considered a variety of offshore fishing data sources: vessel trip reports (VTRs), vessel monitoring systems, and Marine Recreational Information Program data. Each data source has merits and limitations, as none of these data reporting systems were designed to assess the spatial distribution and value of offshore catch. A variety of studies are currently underway to generate additional data sharing systems and assessment tools.
    - Other sources of data and improved methods should be incorporated into impact assessment as they become available. For example, vessel monitoring system (VMS), automatic identification system (AIS), and electronic monitoring data are becoming more prevalent and may present opportunities to improve upon existing methods. These data may offer higher spatial and temporal resolutions, and address challenges associated with self-reporting, when compared to VTRs.

    - Additional methods are particularly needed to understand potential changes to recreational fishing activities.

The localized impacts from the construction and operation of the Revolution Wind Farm to marine and avian organisms may be significant; however, this project will result in substantial reduction of regional fossil fuel generation and lower emissions of nitrogen oxides and carbon dioxide. Therefore, on balance, the RIDEM is supportive of the Revolution Wind Farm and its contribution to mitigating the impacts of climate change.

The RIDEM is pleased to provide comments regarding the Revolution Wind Farm COP. Should you have any questions regarding these comments, please feel free to contact Julia Livermore (julia.livermore@dem.ri.gov; 401-423-1937).

Sincerely,

M. Conor McManus, PhD
Chief of Marine Fisheries

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