Revolution Wind Farm and Revolution Export Cable – Offshore Wind Energy Project

Essential Fish Habitat Assessment—Addendum

March 20, 2023

For the National Marine Fisheries Service

U.S. Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

This report should be cited as:

Bureau of Ocean Energy Management (BOEM). 2023. *Revolution Wind Farm and Revolution Wind Export Cable – Development and Operation. Essential Fish Habitat Assessment—Addendum*. Prepared for the National Marine Fisheries Services. Seattle, Washington: Confluence Environmental Company.

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Acronyms and Abbreviations

BA	Biological Assessment
BOEM	Bureau of Ocean Energy Management
COP	Construction and Operations Plan
CRMC	Coastal Resources Management Council (Rhode Island)
ft	feet
HAPC	Habitat Areas of Particular Concern
HDD	horizontal directional drill
IAC	Inter-Array Cable
IPF	impact-producing factor
ITR	Incidental Take Regulation request (Marine Mammal Protection Act)
kg	kilogram
km	kilometer
Lat	latitude
Long	longitude
m	meters
mg/L	milligrams per liter
MEC/UXO	Munitions, Explosives of Concern/Unexploded Ordnance
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
OCS	Outer Continental Shelf
OSS	offshore substations
OSS-link	offshore substation link cable
Q1, Q2, Q3, Q4	Annual quarter (Jan-Mar, Apr-June, Jul-Sep, Oct-Dec)
Revolution Wind	Revolution Wind, LLC
RI	Rhode Island
RI/MA WEA	Rhode Island/Massachusetts Wind Energy Area
ROV	remotely operated vehicle
RWEC	Revolution Wind Export Cable
RWEC–OCS	RWEC within federal waters
RWEC–RI	RWEC within Rhode Island state waters
RWF	Revolution Wind Farm
SAV	submerged aquatic vegetation
SNE	Southern New England
TBD	to be determined
TSS	total suspended sediment
UXO	unexploded ordnance
WROV	work class remotely operated vehicle
WTG	wind turbine generators

1.0 Introduction

BOEM has prepared this addendum to the *Revolution Wind Farm and Revolution Wind Export Cable – Development and Operation: Essential Fish Habitat Assessment*, dated February 6, 2023 (the EFH Assessment), in response to a list of requests for clarification and additional information received by email from the National Marine Fisheries Service (NMFS) on February 17, 2023. BOEM has organized the information request attached to this email into a comment and response matrix, provided in the following section. All requests are addressed in this matrix and, where indicated, in revised figures included as attachments to this addendum.

NMFS has asked that certain project features be displayed on the web-based mapping tool developed for the project (https://www.gisvisuals.com/Orsted/Revolution/EFH/), referred to hereafter as the "popup viewer." All the requested features have been added to the viewer and are identified in the responses provided below.

2.0 Responses to Information Requests

The comment and response matrix providing the additional information and clarification requested by NMFS is presented below as Table 1.

Table 1. BOEM responses to NMFS comments and requests for additional information on the Revolution Wind EFH Assessment.

Comment/ Request #	NMFS Topic/General Request	NMFS Comment/Specific Request	BOEM Response
1	Horizonal Directional Drilling (HDD) Activities: Please provide more specific information related to the location, timing and area for construction activities associated with HDD.	Page 6 provides five different potential methods for construction activities related to HDD. Please clarify if there is a method that is more likely to occur or if Orsted has identified the method they propose to use.	Four sea-to-shore transition construction methods are proposed on page 6 of the EFH Assessment. A preferred method has not been identified at this time; therefore, the EFH Assessment analyzes the most impactful method for each IPF. Proposed construction methods are as follows: • Casing pipe: The HDDs would be directed into a casing pipe driven diagonally into the seabed. No dredging would be required for this construction method. The casing pipes would be installed using a pneumatic hammer deployed from a barge. Each pipe would be supported by up to six "goal posts," each comprising two vertical sheet piles driven into the substrate with a horizontal crossbeam. The goal post vertical sheet piles would be installed using vibratory hammer. Each vertical pile would be approximately 30 m (100 ft) long by 0.6 m (2 ft) wide by 2 cm (1 in) thick. Installation of the 44 goal post sheet piles would require approximately 6 days, assuming 7 piles installed per day, and 30 minutes of vibratory hammer operation per pile during the 7 a.m. to 6 p.m. construction period permitted by local noise ordinance, North Kingstown, RI Ord. No. 83-3(a). Once sea-to-shore transition construction is complete, the vertical goal post sheet piles would be removed using a vibratory hammer. The estimated duration of hammer operation for removal would be approximately the same as for installation. • Uncontained dredging: HDD exit pits would be dredged using a backhoe excavator and Venturi eductor device. No temporary construction structures would be used, so no pile driving would be required. Once sea-to-shore transition construction is complete the HDD exit pits would be backfilled with the original dredged material. • Sheet pile cofferdam: The HDD exit pits would be contained within temporary sheetpile cofferdams. Once constructed, the seabed within the cofferdams would be dredged using a backhoe excavator deployed from a barge. Each cofferdam would measure 50 m (164 ft) long by 10 m (33 ft) wide and would extend 3 to 4 m (10 to 14 ft) above the water

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			surface. Assuming standard sheet pile dimensions of 30 m (100 ft) long by 0.6 m (2 ft) wide by 2 cm (1 in) thick, this equates to approximately 197 sheet piles per cofferdam. Each cofferdam would require approximately 14 days to install at an installation rate of 14 sheet piles per day. Approximately 30 minutes of vibratory hammer operation would be required per pile, or 7 total hours during the 7 a.m. to 6 p.m. construction period permitted by local noise ordinance, North Kingstown, RI Ord. No. 83-3(a). Concurrent pile driving is not proposed; therefore, installation of both cofferdams would require a total of 28 days. Once sea-to-shore transition construction is complete, the HDD exit pits would be backfilled with the original dredged materials and the cofferdam sheet piles would be removed using a vibratory hammer. The estimated duration of hammer operation for cofferdam removal would be approximately the same as for installation (i.e., 30 minutes/pile, 14 piles/day, 14 days/cofferdam, 28 days total). • Gravity cofferdam: HDD exit pits contained within pre-constructed cofferdams would be lowered onto the seabed from a barge and held in place by weight. No pile driving would be required for installation or removal. Once constructed, the seabed within the cofferdams would be dredged using a backhoe excavator deployed from a barge. No temporary construction structures would be used, so no pile driving would be required. Once sea-to-shore transition construction is complete, the HDD exit pits would be backfilled with the original dredged materials and the cofferdams would be lifted onto a barge for demobilization. Deployment and removal would require approximately one day for each cofferdam, or four days total. As stated above, the impact analyses presented in the EFH Assessment assume the most impactful method for the relevant IPF. For example, the TSS and sediment deposition analysis considers the impacts of the uncontained dredging method, the underwater noise impact analysis considers the impacts of sheet pile cofferdam installation, etc.

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2	HDD	Page 27 of the document states HDD activities will occur in an "intertidal area in waters approximately 13 feet (4 meters) deep. The specific distance offshore is still to be determined but would be located in an area where no SAV is present." Please provide the anticipated location for the proposed HDD pit as well as the habitat present in this area. Please clarify if these activities are proposed to impact juvenile cod HAPC.	Proposed HDD exit pit coordinates are as follows: HDD Exit Pit (East) Lat: N041° 34' 57.99" Long: W071° 25' 30.86" HDD Exit Pit (West) Lat: N041° 34' 56.75" Long: W071° 25' 32.10" The HDD exit pit locations are in the nearshore zone in soft bottom habitat composed of mud and sandy mud. No mapped HAPC, SAV, or other sensitive habitat features are present in this area, as documented in the EFH Assessment and the Benthic Habitat Mapping Report (Inspire Environmental 2023), included as Appendix A to the EFH Assessment.
3	HDD	Some of the methods proposed included non-contained dredging. Please provide information on the distance from any SAV beds and any turbidity modeling that was conducted for these activities (and cable laying) in Narragansett Bay.	Proposed HDD exit pit coordinates and documented SAV occurrence are displayed on the pop-up viewer as features HDD Exit Pit and SAV Presence, respectively. As shown, the closest documented SAV beds are approximately 250 m from HDD Exit Pit (East), along the armored shoreline immediately to the east of the landfall envelope. Revolution Wind will avoid construction in state waters during the peak SAV growing season (i.e., July 1 to September 1) to minimize potential TSS and sediment deposition effects associated with sea-to-shore transition construction. A detailed TSS and sediment deposition modeling analysis was developed to support the project (RPS 2022) and is included in the COP as Appendix J. This analysis considered the impacts of the uncontained dredging installation method, the results of which are presented in Section 5.1.2.4 of the EFH Assessment. As shown in Table 5.9 of the EFH Assessment, TSS plumes exceeding 100 mg/L could extend up to 400 m from the exit pits. However, as demonstrated in the visualizations presented in COP Appendix J, Hydrodynamic and Sediment Transport Modeling Report, modeling results indicate that prevailing currents would disperse the sediment plume predominantly parallel to the shoreline. These findings indicate that TSS

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			concentrations exceeding 50 mg/L and sediment deposition exceeding 0.1 mm are unlikely to reach mapped SAV beds.
4	HDD	Please clarify the extent of the area expected to be impacted by this activity. Some portions of the EFH assessment suggest 0.42 acres of impact, while other sections suggest 1.5 acres of impact.	The area impacted by sea-to-shore transition construction varies by IPF (e.g., benthic impact footprint, underwater noise, TSS). However, the 1.5-acre figure appears to be incorrect. The maximum area impacted by cofferdam construction is approximately 0.25 acre, assuming 2 cofferdams each with plan view dimensions of approximately 164 by 33 ft.
5	HDD	Please provide information on the proposed timing of this activity. It is unclear if this is considered “landfall construction” under Figure 2.2	This activity would take place during the landfall construction period. The revised indicative construction schedule is provided as Figure A-1 in attachment A. Landfall construction is scheduled in to begin in Q3 of 2023 with completion by February 1, 2024, as limited by time of year restrictions in state waters.
6	Boulder Relocation Activities: Please provide more information related to the boulder relocation activities, including the anticipated area where these activities are expected to occur. Information gained from the presentation Orsted provided on Seabed preparation was helpful, but some of the details identified were not included in the EFH assessment.	Please provide specific maps (or add existing shapefiles to the pop up viewer) that identify the anticipated locations for use of the Boulder Plough and the Boulder skid push and boulder pick. We understand Orsted has a general idea of where these activities would occur, we request this information be provided. Ideally, if possible, it would be helpful to have these as layers in the pop up viewer.	The boulder plow will be used on the RWEC corridor between KP 45 to KP 56 (mile 28 to 35). A feature identifying this location, *Boulder Plow Area (KP 45-56)*, has been added to the popup viewer. The boulder grab will be used for seabed preparation in the RWEC, IAC, and OSS-link corridors and around WTG and OSS foundations. The WROV boulder skid will be used as support equipment in conjunction with the boulder grab. Additional details are provided in response to request #7 below.

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7	Boulder Relocation	While additional information related to the boulder plough has been included, it would be helpful to understand more about the boulder skid push and the anticipated effects (e.g., anticipated berms or mounds left as a result). Page 25 suggests there will be two specific zones where this will be used. Please provide information on where those specific areas are located. Please add any available details related to the use of this equipment.	The WROV push skid is an entirely separate technology from the boulder plow. Revolution Wind plans to use the push skid in conjunction with the boulder grab as a secondary boulder relocation tool at foundation sites and within the IAC installation corridor. Using these devices together will increase the efficiency of the boulder relocation process. The WROV push skid and boulder grab will be deployed from the same vessel. Push skid use will be determined by real time conditions such as vessel positioning and ability to deploy the boulder grab and push skid concurrently; therefore, it is not possible to determine specifically where it will be used at this time. The WROV is a 1.5-m wide, free flying system attached to the deploying vessel by an umbilical. It is equipped with cameras and thrusters and is primarily used to inspect boulders before removal by the boulder grab. It has no tracks and is not designed to operate on the bed surface. The system will primarily be used to inspect boulders for relocation by the boulder grab but will also be used opportunistically to move small boulders where practicable to increase the overall efficiency of the boulder relocation process. The WROV is equipped with a small skid plate approximately 1.5 m wide capable of rolling small (less than 0.7m in diameter) unburied boulders over short distances. The WROV is not powerful enough to displace partially buried boulders or drive large boulders across the seabed like a plough. The WROV skid will be used to push or roll small (<0.7 m diameter) boulders over short distances to the edges of planned working areas (approximately 10-15m on a cable route, or within 10 m of the edge a 100 m radius around foundation work areas). Push skid operation will not create slots or berms, therefore no backfill will be required.
8	Boulder Relocation	It's our understanding that Orsted has committed to RICRMC their intent to group the relocated boulders next to nearby boulders. Please provide more details on this plan. Will this be done for all areas (i.e. cable route, WTG locations) or are their specific locations within these areas where this will be conducted?	As part of the CRMC Category B Assent, Revolution Wind agreed to supply a Boulder Relocation Plan, which shall describe procedures to ensure sensitive benthic habitats are preserved to the extent possible, and that when relocated, boulders do not negatively impact EFH. BOEM has also agreed that boulders shall be relocated to areas with similar bottom (seabed) types within the 50-m surveyed corridor where reasonably practicable and shall not be placed in sensitive or complex hard bottom habitats. Revolution Wind has indicated they will make the same commitment for

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			cable routes and WTG locations in federal waters, to the greatest extent practicable. Additionally, as described during the February 7, 2023 meeting, Revolution Wind will commit to grouping relocated boulders to the greatest extent practicable, in order to avoid fishing gear conflicts. For example, if a collection of boulders exists along the cable route which requires relocation for installation purposes, Revolution Wind will group those relocated boulders together and where reasonably practicable, group them next to nearby boulders. Similarly, where reasonably practicable for individual boulders, Revolution Wind will move those to the close vicinity of nearby existing boulders. These activities are dependent on the function of the boulder grab and boulder grab vessel, which is intended to relocate boulders approximately 8 to 15 m off the centerline of the route. Furthermore, BOEM has included an agency-proposed mitigation measure to require a boulder relocation plan. The plan must be submitted to BOEM at least 90 days prior to inter array cable corridor preparation and cable installation (e.g., boulder relocation, pre-cut trenching, cable crossing installation, cable lay and burial) and foundation site preparation (e.g., scour protection installation).
9	Boulder Relocation	Page 31 states that the berm spoils will be used to backfill the trench by running a backfill pass with the plow after cable installation is complete. Please describe more details on the backfilling process. Is this proposed for all areas along the cable or only areas within complex habitats?	To clarify, the boulder plow is the only cable installation technology expected to create large berms. The hydrojet, capjet, and mechanical plows excavate a trench, install the cable, and backfill simultaneously. The boulder plow simultaneously clears boulders and excavates the trench for subsequent cable installation. A backfill pass with the plow is then used to refill the trench with the berm spoils, completing cable burial. The boulder plow will only be used at the locations identified above in response to request #6. Habitat types present in this area are displayed on the popup viewer. As shown, the planned boulder plow use area is composed predominantly of soft-bottomed and complex habitat interspersed with patches of large-grained complex habitat.

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10	Pile Driving Activities: Please provide clarification on the proposal for 24-hour period of pile driving.	Page 23 states, "For each WTG it is assumed 6,500 strikes over up to 220 minutes would be required for each pile, with up to three piles installed per day. For the OSSs it is assumed up to 11,500 strikes over 380 minutes would be required to install each OSS pile, with up to two days required to install both OSSs. It is assumed that multiple pile-driving rigs would operate simultaneously, such that up to three monopiles would be installed in a 24-hour period, and up to 81 monopiles piles would be installed over a single five-month campaign". Please verify that Orsted is proposing to pile drive 24 hours a day for 5 consecutive months, which would include an estimate of approximately 19,500 strikes per day (24 hour period).	BOEM is revising the number of pile strikes presented in the EFH Assessment for consistency with the assumptions and analyses used in the NMFS BA for the project and Revolution Wind's ITR application. WTG monopile installation is anticipated to require approximately 10,740 pile strikes over approximately 220 minutes per foundation. OSS installation is anticipated to require approximately 11,563 pile strikes over approximately 380 minutes per foundation. These per pile strike rates are pulled from the most recently updated (August 2022) Acoustic Modeling Report. Regarding the verification question, Orsted is not proposing to pile drive 24 hours a day for 5 consecutive months. Orsted is proposing a maximum installation rate of up to 3 WTG monopiles or 2 OSS monopiles per day, or a maximum of 32,220 strikes for WTG installation and 23,126 strikes for OSS installation in a given 24-hour period. In total, up to 12 hours of discontinuous pile driving could occur any given construction day over the course of 5 months. Revolution Wind is not proposing to install more than one WTG or OSS foundation at any given time, therefore concurrent pile driving will not occur.
11	Pile Driving Activities	We appreciate the additional information that was provided related to pile driving activities. However, some of the information requested in our June 2022 letter has not been incorporated. Specific to the proposed action, please provide information related to the extent of acoustic impacts within and outside the project area (a map or graphic would be helpful). Additionally, please provide information on proposed plans for adaptive monitoring to ensure target attenuation levels are met.	The EFH Assessment submitted to NMFS includes the requested figure and supporting analysis: Figure 5.1 displays the approximate maximum extent of potential sound impacts on EFH species from impact pile driving, and Table 5.4 presents the range of modeled threshold distances for pile driving-related noise producing activities by EFH species hearing group. A review of current literature and supporting analysis of sound pressure and particle motion effects is provided in Section 5.1.1.4. EFH Assessment Figure 5.1 displays both SPL and currently quantifiable particle motion effects for invertebrates. Insufficient information is available to estimate threshold distances for particle motion effects on fish, particularly those associated with seabed vibration, which is substrate dependent. Therefore, these effects cannot be usefully represented on the figures provided.

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			An updated version of Figure 5.1 and a companion figure displaying the extent of potential noise impacts from pile driving methods that may be used at the sea-to-shore transition site are provided in Attachment B. The updates include the bathymetric contours requested in NMFS June 24, 2022, comment letter. NMFS also requested that benthic habitat types be displayed on the same figures. BOEM feels that this would not be practicable or useful for the following reasons: 1. The generalized impact areas for some noise effects extend beyond the areas surveyed by Inspire Environmental (2023); therefore, the distribution of habitat types in these areas is not known. 2. The impact area features shown are generalized representations of the potential extent of noise impacts, not accurate depictions (see Attachment B for additional discussion). Therefore, attempting to interpret habitat exposure to noise effects from these features could result in conclusions based on false precision. 3. Displaying benthic habitat types would compromise overall legibility and the ability to discern certain noise impact features from the background habitat layer. The distribution of habitat types within the RWF and RWEC corridor and the location of noise generating project features are provided in the EFH Assessment in Figures 3.3 and 3.4. In addition, the EFH Assessment was revised to include detailed habitat type mapping by zone in response to prior NMFS information requests. Please see Section 3.5 in the EFH Assessment for the associated maps and habitat descriptions. A sound field verification plan was provided as Attachment 7 in the Protected Species Mitigation and Monitoring Plan (PSMMP; COP Appendix Z; https://www.boem.gov/renewable-energy/state-activities/appz3-revpsmmp). This noise measurement plan for sound field verification (SFV) is proposed in connection with the planned foundation installation activities for Revolution Wind. At least 90 days prior to planned start of pile driving, a sound field verification plan will be submitted to NMFS by the lessee for review and approval.

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12	Cable Installation Activities: Please clarify information related to the proposed cable installation.	The EFH assessment describes the type of cable installation proposed, including jet plow and mechanical plow. It's our understanding that Orsted has a general idea of where each type of activity may occur. Please provide in the EFH assessment, the anticipated habitat types that may warrant each type of installation method and the anticipated locations for these activities.	The selection of cable installation equipment is based on several factors including, but not limited to, the habitat types present. Planned equipment types are as follows:
			• RWEC: A hydrojet plow will be used from the HDD exit pits to approximately KP 9, south of Jamestown Bridge. A mechanical plow will be utilized in all other parts of RWEC route except:
			  ○ KP 45 to 56 where the boulder plow will be used, and
			  ○ 100 m on either side of all utility crossings, cable joints, and OSS pull in locations where a capjet will be used. A capjet is a remotely operated jet trenching machine. The capjet is self-propelled and will be used in locations where the towed hydrojet or mechanical plow are not practicable.
			• OSS-link: A mechanical plow will be used.
			• IAC: Revolution Wind anticipates that 50% of cable length will be installed with a jet plow and 50% will be installed utilizing a mechanical cutter. The former will be used primarily in soft-bottomed habitat; the latter will be used in hard or mixed substrates.
			RWEC and OSS-link mechanical plow will employ simultaneous lay and bury. The boulder plow, capjet, and IAC installation equipment will install cables pre-laid on the sediment. This approach is needed where the spacing between foundations will not allow simultaneous lay and bury using towed equipment. The duration between cable lay and subsequent burial is not fixed. Revolution Wind will minimize this duration to the extent practicable. In most cases, pre-laid cables will be buried within hours to days. This cannot be guaranteed, however, as schedule flexibility is necessary to account for vessel availability, installation efficiency, and the need to respond to unpredictable weather conditions. In rare cases, Revolution Wind estimates that cables may remain on the seafloor for up to 28 days prior to trenching to accommodate these needs.

13	Cable Installation Activities	On page 7- Please clarify what is meant by a "BOEM approved corridor".	This is the RWEC installation corridor approved by BOEM, separate from the Lease Area. This installation corridor contains the indicative RWEC routes and associated installation impact buffers and additional area to

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			accommodate micrositing to avoid sensitive habitats, cultural resources, or other features (e.g., the 16 UXOs identified within the installation corridor). Benthic habitats within the entirety of the approved corridor have been mapped and are described in the EFH Assessment as zones RWEC-OCS and RWEC-RI (see Sections 3.5.6 and 3.5.7, respectively).
14	Cable Installation Activities	Please provide more details on how you plan to lay cable through areas identified as HAPC, including the methods and time of year proposed.	The revised indicative project schedule is provided in Attachment A. No cable laying or other construction activities will be conducted in currently mapped inshore Juvenile Cod HAPC. Summer Flounder HAPC comprises macroalgae and SAV wherever it occurs within currently designated EFH, which covers the entire project area. No permanent macroalgae or SAV beds have been identified within the approved installation corridor. Free floating SAV beds could occur in cable installation corridors during construction. These features will be avoided to the extent practicable. The IAC, OSS-link, and a portion of the RWEC installation corridor in zone RWEC-OCS overlap SNE HAPC. Cable installation methods used in each of these corridors is provided in the response to request #12.
15	Cable Installation Activities	Page 34 states - “Where bed features like boulder fields or bedrock outcroppings prevent burial, the cable would be laid on the bed surface and secondary cable protection would be used to protect the cable from damage”. Please provide more specific information related to cables left on the seafloor. Will there be no attempt to bury the cable at all in areas where boulder fields are located? Please provide more details on the specific locations where Orsted does not anticipate burying the cable.	To clarify, Revolution Wind intends to bury all cables wherever practicable and microsite the route as needed to achieve this objective. Cable protection would be employed where either 1) a cable segment cannot be buried due to site-specific conditions identified prior to or during construction, or 2) post-construction surveys indicate that burial to desired target depths of 4 to 6 ft was not achieved. In the latter case, Revolution Wind will assess the need for cable protection on a site-by-site basis considering several risk factors, including likelihood of exposure by sediment mobility and risk of damage or disturbance by vessel anchoring or commercial fishing activity, etc. As such, the locations where cable protection will be used will not be known until installation is completed. Revolution Wind has estimated cable protection requirements as a proportion of overall route length based on experience with other offshore wind energy projects. BOEM is providing additional clarification regarding RWEC cable protection. In addition to currently unknown locations comprising approximately 5 percent of route length, cable protection will also be required at seven known locations where the RWEC crosses buried utilities identified during pre-construction surveys. The indicative locations for the crossing points and

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			associated benthic habitat types are displayed as the *Cable Crossings* and *NOAA Complex Habitat* features on the Revolution Wind popup viewer, respectively, and are as follows: • U.S. Army/RI (abandoned water main): Lat 41.506918, Long -71.409197 (complex habitat) • Verizon (telecommunications cable): Lat 41.492481, Long -71.408455 (complex habitat) • Verizon (telecommunications cable): Lat 41.491883, Long -77.4084 (complex habitat) • Verizon (telecommunications cable): Lat 41.488649, Long -71.408158 (complex habitat) • Unknown (TBD): Lat 41.488341, Long -71.408144 (complex habitat) • Unknown (TBD): Lat 41.487651, Long -71.408103 (complex habitat) • Unknown (TBD): Lat 41.431417, Long -71.407095 (soft-bottomed habitat) Cable protection requirements at these locations comprise an additional 9.5 percent of RWEC route length. Therefore, the total amount of RWEC cable protection required at currently known and unknown locations will comprise approximately 14.5 percent of route length.
16	Cable Installation Activities	Page 28 states "the cable may be laid on the seabed and then trenched post-lay". Please provide information related to how long the cable will be left on the seafloor before trenching and burial occurs.	See response to request #12 provided above. BOEM anticipates that trenching and burial of pre-laid cables will typically occur within 24 to 48 hours. In rare cases cables could remain on the seabed for up to 28 days before installation. This is necessary to maintain schedule flexibility to respond to variable factors like vessel availability and adverse weather conditions in real-time.

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17	Cable Installation Activities	Page 26 discusses joint construction activities. Please provide information on where this is expected to occur in the project area and the habitat type. It is our understanding that Orsted has identified 4 locations where this may occur. Please provide information on the scour protection associated with this activity.	Four cable joints, two on each RWEC circuit, are currently planned at two locations within habitat zone RWEC-RI. Indicative coordinates for these locations are as follows: • Site 1: Lat 41.513275, Long -71.406800 • Site 2: Lat 41.459718, Long -71.409620 These locations are displayed as feature *HDD Exit Pit* on the popup viewer. As shown, joint site 1 is located on or near a transition between soft-bottomed and complex habitat. Habitat impacts at this location could occur in either or both habitat types. The indicative location for Joint site 2 is in soft-bottomed habitat.
18	Cable Installation Activities	Please provide information on the locations of anticipated cable crossings, as well as the habitat type in these locations. Please discuss if cable crossings are expected to occur in HAPC.	Indicative locations and habitat types present at identified RWEC utility crossings are provided in the response to request #15. These features are also displayed on the Revolution Wind pop-up viewer. None of the proposed crossing locations are in mapped HAPC.

19	Scour Protection: Please provide additional details related to scour protection proposed and anticipated location	Please provide a more detailed description of the following - 1) rock blankets (described as scour proposed for the WTGs) and Armor stone rock class LMA5/40	Foundation scour protection will comprise rock class LMA5/40; engineering specifications are as follows:
			• Particle Density 2,650 kg/m^3
			• Armor stone obtained from blasted rock faces. Materials are not sourced from riverbed mining/extraction or equivalent.
			• Mudstone, shale, and slate rock or similar materials that are likely to cleave during handling are not acceptable.
			• Armor stone length to thickness ratio and strength requirements:
			  ○ Length to thickness ratio, for filter layer: LT_{30}
			  ○ Length to thickness ratio, for armor layer: LT_{20}
			  ○ Compressive strength: CS_{80}
			  ○ Water absorption: $WA_{0.5}$

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			○ Resistance to wear, Micro Deval: $M_{DE}20$ ○ Crushed or broken surfaces: RO_5 ○ Durability requirements: DS_A ○ Sonnenbrand: SB_A • Armor stone grading specifications: ○ Grading: 5-40 kg ○ Category LMA5/40 ○ Average particle mass: 10-20 kg ○ Mass distribution (particle mass, % less than): 80 kg, 97-100%; 40 kg, 70-100%; 5 kg, 0-10%; 1-5 kg, 0-2% (fragments)
20	Scour Protection	Page 35 states, "It is estimated that 10 percent of the 155-mile IAC network, 10 percent of the 9.3-mile OSS-link cable, 10 percent of 18.6-mile RWEC OCS cable route (for each cable), and 19.5 percent of the RWE RI cable route (for each cable) would require secondary cable protection. In total, approximately 139.1 acres of cable protection would be required over approximately 29 miles of cable route. Revolution Wind has indicated that typical cable protection would be approximately 39 feet (12 meters) wide." Please provide any additional details related to anticipated locations for this scour protection.	As stated in the response to request #15, except where indicated below, the specific locations where cable protection will be required are not currently known and will be determined after cable installation is complete. Cable protection would be employed where either 1) a cable segment cannot be buried due to site-specific conditions identified during construction, or 2) post-construction surveys indicate that burial to desired target depths of 4 to 6 ft was not achieved. In the latter case, Revolution Wind will assess the need for cable protection on a site-by-site basis considering several risk factors, including likelihood of exposure by sediment mobility, risk of damage or disturbance by vessel anchoring or commercial fishing activity, etc. Revolution Wind has estimated cable protection requirements as a proportion of overall route length based on experience with prior projects. All cable protection will have an indicative width of 39 ft (12 m). Cable protection acreage is estimated from indicative width and the stated proportions of route length for each cable. BOEM is also providing a clarification regarding RWEC cable protection. Revolution Wind initially estimated that up to 10 percent of RWEC circuit length would require cable protection where post-construction surveys determine burial to desired target depths has not been achieved. Subsequent to submittal of the EFH assessment, Revolution Wind decreased this estimate to 5 percent of route length for each RWEC circuit.

Comment/ Request #	NMFS Topic/General Request	NMFS Comment/Specific Request	BOEM Response
			In addition to these unknown locations, cable protection will be required at seven known utility crossing locations identified in the response to request #15. Cable protection at these locations will comprise an additional 9.5 percent of RWEC route length. Therefore, the total amount of RWEC cable protection required at currently known and unknown locations will comprise approximately 14.5 percent of RWEC route length. With this change, cable protection impacts would decrease from the previous estimate of 139.1 acres to a total of 128.2 acres for all cables combined.
21	UXO	Please provide any additional details related to the known locations of UXOs where micrositing is anticipated.	Known UXO locations are displayed as feature *Unexploded Ordinance* on the popup viewer and are as follows: • 1: Lat 41-27-7.68N; Long 071-24- 35.64W • 2: Lat 41-27-25.74N; Long 071-24-38.94W • 3: Lat 41-27-33.60N; Long 071-24-38.34W • 4: Lat 41-24-49.80N; Long 071-22-58.14W • 5: Lat 41-26-40.32N; Long 071-24- 42.54W • 6: Lat 41-26-34.44N; Long 071-24-38.22W • 7: Lat 41-26-00.18N; Long 071-24-30.48W • 8: Lat 41-28-00.96N; Long 071-24-28.68W • 9: Lat 41-24-43.74N; Long 071-21-34.44W • 10: Lat 41-24-56.52N; Long 071-21-59.64W • 11: Lat 41-24-52.62N; Long 071-23-43.62W • 12: Lat 41-27-38.880N; Long 071-24-36.978W • 13: Lat 41-26-4.324N; Long 071-24-30.591W • 14: Lat 41-27-36.236N; Long 071-24-37.026N • 15: Lat 41-26-44.709N; Long 071-24-38.974W • 16: Lat 41-24-45.9 N; Long 071-21-39.48 W

Comment/ Request #	NMFS Topic/General Request	NMFS Comment/Specific Request	BOEM Response
			Revolution Wind had determined that the RWEC circuit routes can be microsited to safely avoid these UXOs. These devices will not be detonated. However, additional UXOs could be encountered, and some of these devices may require detonation in place (see response to request #22 below).
22	UXO	Page 21-22 states "Revolution Wind anticipates that Munitions and Explosives of Concern/Unexploded Ordnance (MEC/UXO) may be encountered within the Lease Area and along the RWEC route. Revolution Wind (2022b) has identified 16 UXOs, ranging from 5 to 1,000 pounds in size within the RWEC corridor near the mouth of Narragansett Bay. Revolution Wind has determined that all 16 of UXOs identified to date can be avoided by shifting the RWEC route within the approved installation corridor". It later goes on to suggest that detonation could be possible if any unforeseen UXOs are found that cannot be avoided or moved. Please clarify the number of UXO detonation anticipated for the project.	Consistent with the MMPA Draft Rule and currently available information, BOEM conservatively assumes that up to 13 UXO detonations could be required. As stated, Revolution Wind has identified 16 UXOs to date at the locations identified above. Revolution Wind has determined that these 16 can all be safely avoided without the need for detonation by rerouting RWEC installation within the approved corridor. However, Revolution Wind believes that some risk remains for emergent finds during construction. Revolution Wind would first attempt to mitigate these UXOs using other measures (avoidance, lift and shift, etc.) but may need to resort to detonation in place using the methods described. Revolution Wind is preparing an Emergent Finds Mitigation Plan for submittal to BOEM. The UXO detonation analysis presented in the EFH Assessment considers detonation impacts for devices ranging in size from 5 to 1,000 pounds. BOEM's conservative estimate of 13 detonations in this range of device sizes is adequate to address the anticipated risk of emergent finds. New UXOs could be discovered anywhere within the project area but are most likely to be found in zone RWF 2 and zone RWEC-RI near the mouth of Narragansett Bay based on the UXO risk assessment conducted for the project (Ordtek 2021).
23	Construction Schedule	Please provide clear information related to the timing and schedule of each construction activity. There are tables/graphics that talk about construction schedules but they do not all appear to align. Additionally, Table 2.2 states that WTG construction is expected to occur in 2023. Please verify if this is accurate.	Revolution Wind has developed a revised project schedule, provided as Attachment A to this addendum. The timing of construction activities affecting EFH are as follows: • Landfall construction: Includes sea-to-shore transition construction. In-water work will begin in Q3 2023 and will be completed by February 1, 2024, to comply with time of year restrictions in state waters.

Comment/ Request #	NMFS Topic/General Request	NMFS Comment/Specific Request	BOEM Response
			• RWEC installation: Begins mid Q3 2024, completed in late Q4 2025. Construction schedule in state waters subject to the above timing restrictions. • IAC installation: Route clearance and seabed preparation for cable installation will begin in Q1 and will be completed by mid-Q2 in 2024. Cable installation will begin in mid-Q3 2024 and will be completed by the end of that year. • WTG installation: Will commence in Q2 and will be completed by mid-Q4, 2024. • OSS installation: Route clearance and seabed preparation will begin in late Q2 and will be completed by early Q3, 2024. Foundation and OSS installation will occur in Q3 to Q4, 2024. OSS-link installation will occur in Q1 2025.

3.0 References

Inspire Environmental. 2023. Benthic Habitat Mapping to Support Essential Fish Habitat Consultation Revolution Wind Offshore Wind Farm. Appendix X2 in *Construction and Operations Plan Revolution Wind Farm*. Newport, Rhode Island: Inspire Environmental. February.

Kusel, E.T., M.J. Weirathmueller, K.E. Zammit, M.L. Reeve, S.G. Dufault, K.E. Limpert, and D.G. Zeddies. 2022. Revolution Wind Underwater Acoustic Analysis: Impact Pile Driving during Turbine Foundation Installation. Appendix P3 in *Construction and Operations Plan Revolution Wind Farm*. Silver Spring, Maryland: JASCO Applied Sciences (USA) Inc.

Ordtek, Inc. (Ordtek). 2021. Munitions and Explosives of Concern (MEC) and Unexploded Ordinance (UXO) with Risk Assessment and Risk Mitigation Strategy. Appendix G in *Construction and Operations Plan Revolution Wind Farm*. Boston, Massachusetts: Ordtek, Inc.

RPS. 2022. Hydrodynamic and Sediment Transport Modeling Report Revolution Wind Offshore Wind Farm. Appendix J in *Construction and Operations Plan Revolution Wind Farm*. South Kingstown, Rhode Island: RPS. July.

Attachment A – Revised Project Schedule

Revolution Wind has developed a revised project schedule in the March 2023 version of the Revolution Wind Construction and Operations Plan (COP). BOEM is providing this revised schedule to clarify our responses to NMFS's information request. Figure A-1 displays the indicative project schedule presented in the March 2023 version of the COP. The timing of construction activities that are likely to or could affect ESA-listed species are as follows:

- Landfall construction: Includes sea-to-shore transition construction. In-water work will begin in Q3 2023 and will be completed by February 1, 2024, to comply with time of year restrictions in state waters.
- RWEC installation: Begins mid Q3 2024, completed in late Q4 2025. Construction schedule in state waters subject to the above timing restrictions.
- IAC installation: Route clearance and seabed preparation for cable installation will begin in Q1 and will be completed by mid-Q2 in 2024. Cable installation will begin in mid-Q3 2024 and will be completed by the end of that year.
- WTG installation: Will commence in Q2 and will be completed by mid-Q4, 2024.
- OSS installation: Route clearance and seabed preparation will begin in late Q2 and will be completed by early Q3, 2024. Foundation and OSS installation will occur in Q3 to Q4, 2024. OSS-link installation will occur in Q1 2025.

Figure A-1. Indicative construction schedule for the Revolution Wind Farm and Revolution Wind Export Cable.

Attachment B – Underwater Noise Impact Figures

This attachment presents BOEM's response to NMFS comment/information request #11 for the EFH Assessment (see Table 1 in main body of the addendum). NMFS has requested a figure displaying the extent of acoustic impacts from impact pile driving used for installation of wind turbine generator and offshore substation foundation monopiles. The requested figure for the RWF was provided in the EFH Assessment as Figure 5.1. BOEM is providing an updated version of this figure, now including bathymetric contours, and a companion figure for pneumatic and vibratory pile driving proposed for construction of the RWEC sea-to-shore transition. These are presented below as Figures B-1 and B-2, respectively.

These figures present a generalized representation of the area ensonified by underwater noise above established injury and behavioral effects thresholds. The impact areas shown are based on maximum threshold distances modeled by Kusel et al. (2022) for each hearing group for the respective construction activity. The impact areas displayed in Figure B-1 use these threshold distances as a radius to estimate a circular area of impact around each foundation. The circles are then merged to represent the combined impact area for impact hammer installation of all RWF foundations over the entire installation period. Noise impacts at any given moment will be limited to the circular area of effect around each foundation as it is being installed. The impact areas displayed in Figure B-2 apply the same approach using the sea-to-shore transition construction site as the sound source, using the sound shadowing effect of surrounding shorelines to truncate the area of impact.

While useful as generalized representations, these figures likely overrepresent the extent of potential noise impacts for the following reasons:

- Sound attenuation is a complex process that is influenced by several factors, including temperature, water depth, thermoclines, bathymetry, and substrate composition. Therefore, the distance to threshold in any given direction may be less than the maximum values used in these figures.

- Figures are based on maximum threshold distances modeled in winter. Most noise producing activities would occur during summer, when sound propagates less effectively due to higher water temperatures and thermal stratification.

- Modeled threshold distances for cumulative noise exposure receptor exposure to a predetermined number of pile strikes within a 24-hour period, not accounting for potential animal movement.

Given these limitations, the ensonified areas shown in Figures B-1 and B-2 should be viewed as the areas where underwater noise impacts on EFH species could potentially occur. Actual injury and behavioral effect exposure areas would occur within these boundaries but are likely to be less extensive than shown.

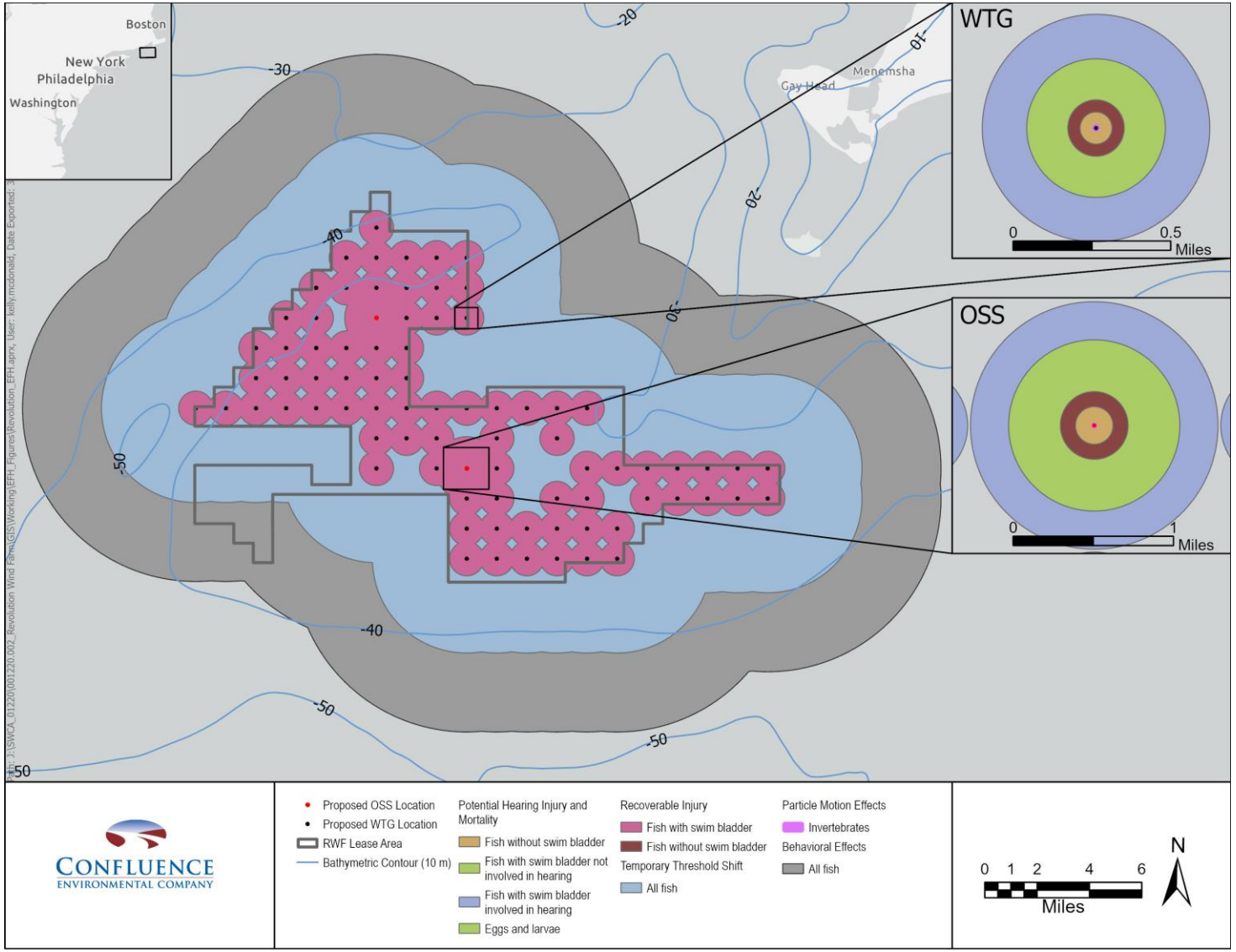

Figure B-1. Approximate extent of underwater noise from impact pile driving for Revolution Wind foundation installation exceeding thresholds for injury and behavioral effects on fish and invertebrates.

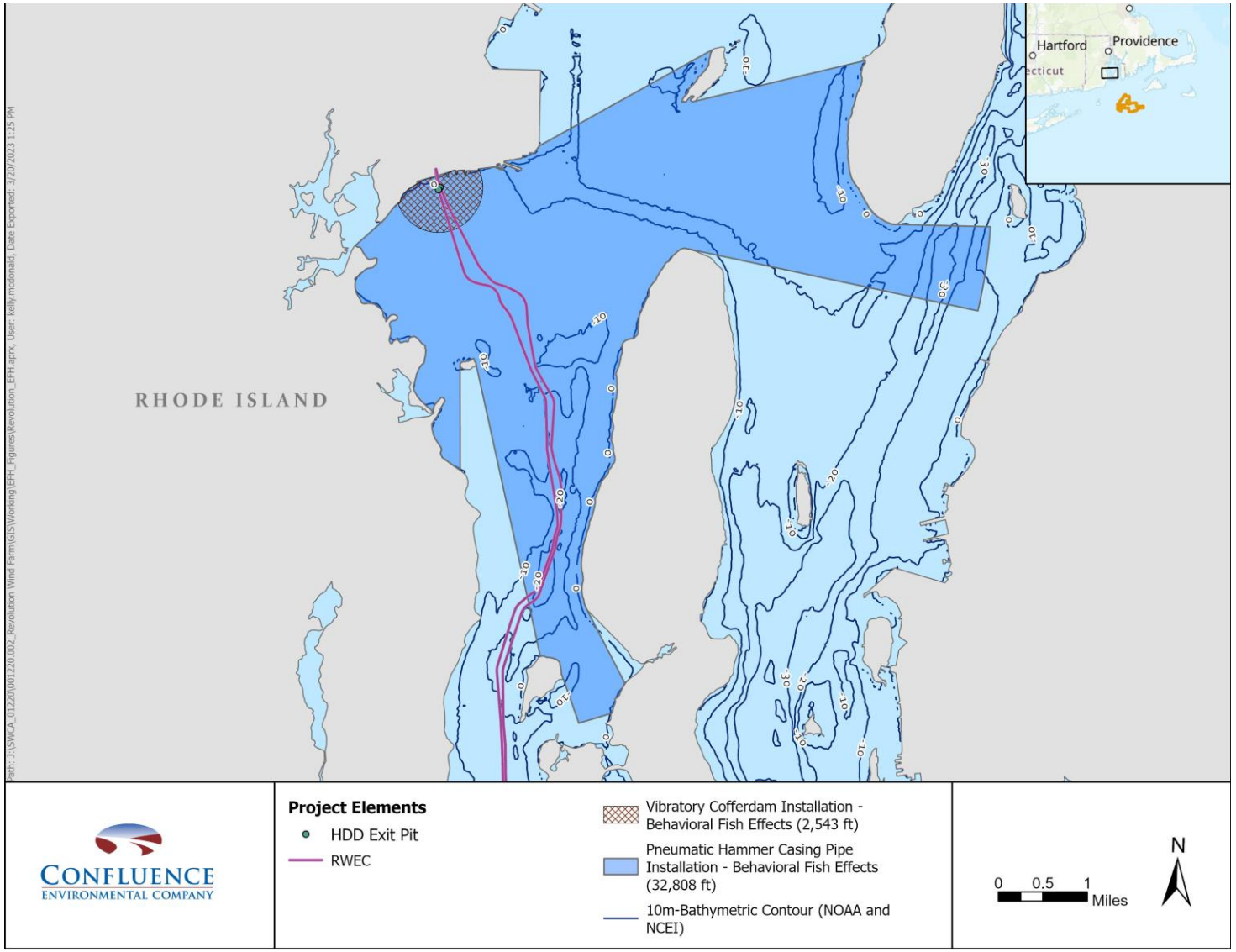

Figure B-2. Approximate extent of underwater noise from Revolution Wind Export Cable sea-to-shore transition construction exceeding behavioral effects thresholds for fish and invertebrates.