STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 20-T-0617 - Application of Sunrise Wind, LLC, for a Certificate of Environmental Compatibility and Public Need for the Construction of Up to 6.2 Miles (320 kilovolt [kV]) of Direct Current (DC) Submarine Export Cable from the New York State Territorial Waters Boundary to the Smith Point County Park on Fire Island in the Town of Brookhaven in Suffolk County and Up to 17.5 Miles (320 kV) of Onshore Transmission Cable from the Landfall at Fire Island to a New Onshore Converter Station in the Town of Brookhaven and Up to 1 Mile (138 kV) of Alternating Current (AC) Onshore Interconnection Cable Connecting to the Existing Holbrook Substation in the Town of Brookhaven in Suffolk County.

ORDER ADOPTING TERMS OF A JOINT PROPOSAL

Issued and Effective:

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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service Commission held in the City of New York on November 17, 2022

COMMISSIONERS PRESENT:

Rory M. Christian, Chair
Diane X. Burman
James S. Alesi
Tracey A. Edwards
John B. Howard, dissenting
David J. Valesky
John B. Maggiore

CASE 20-T-0617 - Application of Sunrise Wind, LLC, for a Certificate of Environmental Compatibility and Public Need for the Construction of Up to 6.2 Miles (320 kilovolt [kV]) of Direct Current (DC) Submarine Export Cable from the New York State Territorial Waters Boundary to the Smith Point County Park on Fire Island in the Town of Brookhaven in Suffolk County and Up to 17.5 Miles (320 kV) of Onshore Transmission Cable from the Landfall at Fire Island to a New Onshore Converter Station in the Town of Brookhaven and Up to 1 Mile (138 kV) of Alternating Current (AC) Onshore Interconnection Cable Connecting to the Existing Holbrook Substation in the Town of Brookhaven in Suffolk County.

ORDER ADOPTING TERMS OF A JOINT PROPOSAL

(Issued and Effective November 17, 2022)

BY THE COMMISSION:

I. INTRODUCTION

In this order, we adopt the terms of a Joint Proposal filed on September 23, 2022, by Sunrise Wind, LLC (Sunrise or

Applicant). There is no opposition to the Joint Proposal, which is signed by Applicant, trial staff of the New York State Department of Public Service (DPS), the New York State Department of Environmental Conservation (DEC), the New York State Department of Agriculture and Markets (DAM), the New York State Department of State (DOS), the New York State Department of Transportation (DOT), and the Long Island Commercial Fishing Association (LICFA) (collectively the Signatory Parties).

The Joint Proposal addresses all the statutory and regulatory issues surrounding Applicant's request for a Certificate of Environmental Compatibility and Public Need (Certificate) pursuant to Public Service Law (PSL) Article VII for authority to construct, operate, and maintain the Sunrise Wind New York Cable Project (Project). As is more fully discussed throughout this order, the Project satisfies a public need and will adversely impact the environment to the minimum extent practicable given the state of available technology, the nature and economics of various alternatives, and all other pertinent considerations.

We determine that the Project is necessary to deliver power from the Sunrise Wind Farm (SWF), an offshore wind energy generation facility to be located in federal waters approximately 30 miles off the east coast of Long Island, to the Long Island Power Authority's Holbrook Substation in the Town of Brookhaven, Suffolk County, and we accordingly grant Applicant a conditional Certificate pursuant to PSL §121.

II. BACKGROUND

A. Procedural History

On December 9, 2020, Sunrise filed its application pursuant to PSL Article VII, as well as a motion requesting that certain Public Service Commission (Commission) regulations governing the contents of such an application be waived.

Approximately 60 days later, the Secretary to the Commission advised Applicant that the application was incomplete, prompting Applicant to file application supplements on April 12, 2021, and June 2, 2021.[1] On July 1, 2021, the application was deemed complete in accordance with PSL §122.[2]

Following procedural conferences conducted shortly thereafter, the Administrative Law Judges issued a Ruling on Party Status and Intervenor Funding, which, among other things, awarded party status and intervenor funding to LICFA.[3] On August 20, 2021, a notice was issued inviting the public to comment on the application at a public statement hearing scheduled for the evening of September 22, 2021. Eleven days later, in compliance with Commission regulations, Applicant filed a Notice of Impending Settlement Negotiations, indicating that exploratory discussions with the parties to the proceeding suggested that a negotiated settlement was foreseeable.

The public statement hearing convened as scheduled, with five speakers, three of whom were in favor of the Project and two of whom expressed concerns. Those commenters who viewed the Project positively stated that it would further New York's efforts to combat climate change and provide well-paying union jobs in the community; one of those opposed to the Project asserted that it would negatively impact commercial fishing

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[1] Applicant's waiver motion was granted in an order issued on March 22, 2021.

[2] Applicant nonetheless filed additional application supplements on January 28, 2022, February 16, 2022, and April 22, 2022.

[3] See Case 20-T-0617, Ruling on Party Status and Intervenor Funding (issued August 5, 2021). A series of related rulings was subsequently issued by the ALJs, resulting in a total intervenor funding award to LICFA of $50,000. See Rulings issued August 20, 2021, September 13, 2021, and April 19, 2022.

operations, while the other urged that a portion of the Project be relocated to avoid ostensible damage to a neighborhood footpath.

Settlement efforts included bi-weekly negotiations and several technical sessions, commencing on September 10, 2021, and continuing for the ensuing 10 months. Such discussions culminated in the Joint Proposal filed on September 23, 2022. According to the Signatory Parties, the Joint Proposal fairly and reasonably considers their potentially competing interests, it is appropriately balanced to ensure protection of those interests, and it produces an outcome that is within the range of results likely to arise from a Commission decision in a litigated proceeding.[4] The Signatory Parties also maintain that the Joint Proposal is "consistent with sound environmental, social and economic policies of the Commission and the State," such that its approval is in the public interest.[5]

B. Notice of Proposed Rulemaking

Pursuant to the State Administrative Procedure Act (SAPA) §202(1), a Notice of Proposed Rulemaking related to the Applicant's waiver requests was published in the State Register on December 30, 2020. No comments related to the waiver requests were received, but nine comments about the Project in general have been received. The comments, including those received from representatives of Suffolk County and the Supervisor for the Town of Brookhaven, predominantly support the Project, citing, among other things, the benefits of transitioning away from fossil fuels to renewable energy

[4] Joint Proposal (JP), p. 4.

[5] Id.

sources.[6] Three commenters, while not opposed to the Project, cited concerns about construction impacts to them and their properties.

C. Description of the Project

Broadly, the Project will transmit up to 924 megawatts (MW) of electricity generated by the SWF as direct current (DC) through New York State territorial waters on the Sunrise Wind Export Cable-NYS (Export Cable).[7] On land, transmission will occur via an Onshore Transmission Cable to a new Onshore Converter Station, where DC is converted to alternating current (AC) and then transmitted along an Onshore Interconnection Cable to the Holbrook Substation, which will be modified to accept power delivered by the Project.[8]

More specifically, the Export Cable is a high-voltage, 320-kV, DC submarine export cable bundle up to 5.2 miles long that will enter New York State territorial waters three nautical miles from land and be routed to a point approximately 2,225 feet offshore from the Mean High Water Line.[9] There, the cable will be landed via horizontal directional drilling (HDD) in two segments – one seaward and one landward - and ultimately connect to the transition joint bay (TJB) situated in the Landfall Work

[6] The comment submitted by the Town Supervisor for the Town of Brookhaven was the only comment received in response to a Notice of Joint Proposal and Opportunity for Public Comment issued by the Secretary to the Commission on October 3, 2022.

[7] Id., Appendix B, p. 1. The Export Cable is referred to as SRWEC-NYS in the Joint Proposal and application materials.

[8] Id.

[9] Id., p. 2. The Project Corridor width of the Export Cable varies, depending on water depth, from 1,434 feet to 1,878 feet.

Area at Smith Point County Park on Fire Island.[10] The Landfall Work Area will require temporary use of an area approximately 570 feet by 500 feet on the paved parking lot of the park. Due to weight limits on the Smith Point Bridge, certain Project components will be transported by barge, necessitating the construction of a temporary landing structure.[11]

The Project will transition from the Export Cable to the Onshore Transmission Cable when the cables are spliced together at the TJB.[12] The Onshore Transmission Cable will travel up to 17.2 miles, primarily within an existing disturbed right-of-way (ROW), to the Onshore Converter Station. The Project Corridor associated with the Onshore Transmission Cable extends the entire width of the ROW, but it will also require a temporary disturbance width of up to 30 feet during construction.[13] Upon completion, the operational corridor is expected to be approximately 5 feet within 20-feet-wide easements to be obtained by Applicant.[14]

The Onshore Converter Station is intended to support the Project's interconnection to the existing electrical grid by transforming Project voltage from 320 kV DC to 138 kV AC.[15] The converter station building site is in Brookhaven's L1 zoning

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[10] The landward side extends approximately 1,054 feet, and an additional 98 feet of onshore underground cable will connect the Landfall HDD to the TJB. Id.

[11] Id., p. 3.

[12] Id., p. 4.

[13] This figure excludes disturbance areas for trenchless crossing locations and splice vaults. Id.

[14] Id. A more comprehensive description of the Onshore Transmission Cable, including its specific route from the Landfall Work Area at the Smith Point County Park to the Onshore Converter Station, is set forth in Appendix B to the JP (pp. 4-6).

[15] Id., p. 6.

district; presently, the site is sparsely vegetated with both gravel and paved locations, as well as multiple buildings and commercial equipment storage areas.[16] Construction is expected to result in about seven acres of disturbance, including the permanent footprint and any temporary disturbance, with the final operations site occupying up to six acres.[17] The entire area will be graveled and surrounded by a perimeter fence, through which access will be provided via at least one walk-through gate and one drive-through gate.[18]

The Onshore Interconnection Cable will connect the converter station with the existing Holbrook Substation.[19] Up to 1.1 miles long and consisting of two AC circuits, it will be routed entirely underground along town roads and existing utility-owned or controlled property.[20] Construction of the Onshore Interconnection Cable will require a temporary disturbance area width of up to 45 feet, exclusive of disturbance areas for trenchless crossing locations.[21] After installation, the operational corridor for each circuit will be approximately 30 feet and within easements obtained by Applicant.[22]

The Holbrook Substation is situated on utility-owned land north of the Long Island Expressway in Brookhaven; it is a single, 2.5-acre parcel in three distinct town zoning districts – L Industrial, B Residence, and C Residence.[23] In order to

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[16] Id.

[17] Id.

[18] Id.

[19] Id., p. 7.

[20] Id.

[21] Id.

[22] Id.

[23] Id.

accept power generated by the Project, the Substation will require a fence line expansion, additional electrical equipment and bus work, as well as the relocation, re-termination, reconfiguration and/or undergrounding of several existing 138 kV and 69 kV overhead transmission circuits.[24] Land disturbance associated with these modifications is anticipated to be about five acres, and the final footprint of the expansion is expected to be two acres.[25]

D. Central Pine Barrens

A portion of the Project will be located on parcels within the Central Pine Barrens region, which is subject to the jurisdiction of the Central Pine Barrens Joint Planning and Policy Commission. About 2.4 miles of the Project will be in the Compatible Growth Area of the Central Pine Barrens and about .6 mile will be in the Core Preservation Area (CPA).[26] The Applicant submitted a request to the Central Pine Barrens Joint Planning and Policy Commission for a CPA Compelling Public Need Hardship, which was approved on April 20, 2022, subject to certain listed conditions.[27]

III. DISCUSSION

A. Legal Authority

Pursuant to PSL §126, the Commission may grant a Certificate for the construction or operation of a major electric transmission facility if it determines the basis of the need for the facility and the nature of the facility's probable environmental impacts. PSL §126 also requires the Commission to

[24] Id.

[25] Id., p. 8.

[26] See Environmental Conservation Law (ECL) §§57-0107 (11), (12).

[27] Evidentiary Record Exhibit (Ex.) 24.

find that the facility avoids or minimizes to the extent practicable any significant adverse environmental impacts, including impacts to agricultural lands, wetlands, parklands, and river corridors the facility will cross, and that the facility avoids or minimizes to the extent practicable any significant adverse impact on active farming operations. Further, the Commission must find that the location of the facility as proposed conforms to applicable state and local laws and regulations, except those local provisions that, as applied to the proposed facility, are unreasonably restrictive considering existing technology, factors of cost or economics, or of the needs of consumers. Finally, PSL §126 requires the Commission to determine that the facility conforms to a long-range plan for expansion of the electric power grid of the State and that the facility will serve the public interest, convenience, and necessity.

The Climate Leadership and Community Protection Act (CLCPA) imposes a requirement on all State agencies to consider, in the context of issuing permits, licenses, administrative approvals and decisions, "whether such decisions are inconsistent with or will interfere with the attainment of the statewide greenhouse gas emissions limits" established by the DEC under the CLCPA.[28] If such administrative approvals or decisions are found to be inconsistent or to interfere, agencies "shall provide a detailed statement of justification as to why such limits/criteria may not be met, and identify alternatives or greenhouse gas mitigation measures to be required where such project is located."[29]

[28] L. 2019, ch. 106, §7(2) (effective January 2020).

[29] Id., §8(1).

Finally, the Commission's Procedural Guidelines for Settlement provide that all decisions, including those adopting the terms and conditions of a joint proposal, must be just and reasonable and in the public interest. The following considerations pertain to this determination here: whether the joint proposal is consistent with the law and regulatory, economic, social, and environmental State and Commission policies; whether the terms of the joint proposal compare favorably with the likely result of a fully litigated case and produce a result within the range of reasonable litigated outcomes; and whether the joint proposal provides a rational basis for the Commission's decision.

B. Basis of Need

The CLCPA requires the State to reduce greenhouse gas (GHG) emissions from all anthropogenic sources 100% over 1990 levels by the year 2050, with an incremental target of at least a 40% reduction in GHG emissions by the year 2030. The CLCPA amended the Environmental Conservation Law (ECL) to establish GHG emission limits of 60% of 1990 emissions by 2030 and 15% by 2050.[30] The CLCPA amended the PSL to require the Commission to establish a renewable energy program targeting 100% GHG-emission-free electricity by 2040 and requiring 70% of the State's electricity to be generated by renewable energy resources by 2030.[31] To help the State achieve these targets, the CLCPA also requires the development of 9,000 megawatts (MW) of offshore wind energy by 2035.

The SWF was one of the proposals selected by the New York State Energy Research and Development Authority (NYSERDA) in response to a competitive request for proposals. In October

[30] ECL §75-0107.

[31] PSL §66-p (2).

2019, the Applicant executed a contract with NYSERDA for a 25-year Offshore Wind Renewable Energy Certificate (OREC) related to the SWF and the Project (the OREC Agreement). The SWF and the Project are being developed to fulfill Sunrise Wind's obligations to NYSERDA in accordance with the OREC Agreement. As specified in the OREC Agreement, the Project will deliver electricity from the offshore SWF to LIPA's existing Holbrook Substation. The Project is therefore necessary for the State to achieve its energy and environmental targets.

C. Probable Environmental Impacts

The Joint Proposal provides a summary of the Project's probable environmental impacts, including potential impacts to land uses, visual and cultural resources, terrestrial and aquatic wildlife, wetland and water resources, topography and soils, transportation, noise, communications, and electric and magnetic fields. We agree with the Signatory Parties that the Project, as described in the Joint Proposal and accompanying appendices, represents the minimum adverse environmental impact and minimum adverse impact on active farming operations, considering the state of available technology and the nature and economics of the various alternatives and other pertinent considerations.[32]

1. Land Use, Agricultural Resources, Active Farmland

The existing land along the proposed Project corridor primarily is underwater land in State territorial waters, is land used for transportation, is land that contains low- to medium-density residential or commercial and industrial zones, or is vacant. To a lesser extent, the corridor also contains high-density residential land, institutional uses, utilities,

[32] JP, p. 11.

surface water land use, and parkland.[33] The Project will be located underwater and underground, primarily in existing roadway and utility ROWs.

The Joint Proposal states that the construction and operation of the Project are expected to have temporary, short-term, and minimal impacts to existing land uses and will not conflict with current or future State or local land-use plans, and we agree.[34] The Project's cable components will be constructed entirely underground, and any onshore areas disturbed during construction will be restored to pre-construction condition, unless otherwise provided for in the Environmental Management and Construction Plan (EM&CP).[35] In addition, all construction activities are to be conducted in accordance with the Proposed Certificate Conditions, local zoning laws, and as discussed in the application materials.[36] The Proposed Certificate Conditions also impose construction and maintenance restrictions during the period between Memorial Day and Labor Day to accommodate seasonal recreational uses of affected parklands, and the EM&CP must include a Maintenance and Protection of Traffic Plan for access to the Project located in open spaces and parkland to ensure that the Project will not hinder recreational uses of those spaces.[37]

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[33] According to the JP, construction on the Project will commence after enactment of S.8750-A, which will authorize the County of Suffolk to alienate certain lands used as parkland to enable Applicant to construct, maintain, and operate a subterranean conduit and electrical distribution cable system. See Proposed Certificate Condition 17; JP, p. 12.

[34] Ex. 5.

[35] See Proposed Certificate Conditions 6, 71; JP, Appendix G.

[36] Ex. 8.

[37] JP, p. 15; Proposed Certificate Conditions 43 (h), 72.

While the Project is to be located near agricultural lands, Project components will not be sited on or cross agricultural districts, shellfish cultivation zones, or aquaculture lease sites. The Project therefore will have no impact on existing agricultural uses or active farmlands, nor will it preclude future development of those resources.[38]

2. Topography, Geology, Soils

We agree with the Signatory Parties that the Project is not expected to have any significant adverse impacts to topography, geology, or soils.[39] The onshore cable components will be installed underground primarily using trenchless construction techniques. Where conventional trenching and excavation will occur, the surface grades will be stabilized and returned to pre-construction conditions where practicable, in coordination with the County and Town Departments of Public Works. Appropriate temporary environmental erosion control measures are required to be used.[40] If soil contamination of the sort that will lead to volatilization or off-gassing of such contamination is detected during construction, the Applicant is required to contact the State Department of Health (DOH), DEC, and DPS prior to continuing soil disturbance.

In some areas, dewatering will likely be necessary to control surface and subsurface water during construction activities. The Proposed Certificate Conditions require a Dewatering Plan outlining appropriate dewatering measures to be included in the EM&CP.[41]

[38] Ex. 5, pp. 4-22, 4-28.

[39] Ex. 5; JP, pp. 29-30.

[40] JP, pp. 29-30, Appendices E and G.

[41] Proposed Certificate Conditions 51-53.

3. Visual Resources

The Project's long-term visual impacts are anticipated to be minor because only the Onshore Converter Station and the expansion of the Holbrook Substation will be visible when construction is complete.[42] Regarding the former, a viewshed analysis determined that it is appropriately sited within a predominantly industrial area, and that existing mature vegetation and densely situated surrounding buildings are likely to shield it from view.[43] Where the Onshore Converter Station is visible, views are expected to be limited to just the uppermost portions of proposed lightning masts that are between 70 feet and 100 feet tall.[44]

The Holbrook Substation expansion will occur in an area surrounded by utility and residential development.[45] Here again, visibility is anticipated to be limited by surrounding buildings and vegetation; to the extent that the area will be visible, views will be similar to those existing today.[46]

Visual impacts during construction are expected to be temporary, short-term, and minor, arising from the presence of construction vehicles and equipment during those times when construction activities are occurring.[47]

4. Cultural and Historic Resources

The application includes an assessment of the Project's potential impact on cultural resources, including marine archaeological resources (MARs), terrestrial

[42] JP, p. 16.

[43] Ex. 1, Appendix 4-B, p. 28; Ex. 5, p. 4-38.

[44] Ex. 5, p. 4-37 to 4-38.

[45] Ex. 23, p. 11.

[46] Ex. 23, pp. 11-12.

[47] JP, p. 16.

archaeological resources, and above-ground historic architectural resources.[48] Addressing these in order, there are three shipwrecks and/or obstructions within one mile of the Export Cable centerline, but none fall within the Export Cable corridor.[49] To avoid accidental disturbance to these or other identified MARS, a minimum avoidance area of 164 feet will be employed, and a qualified marine archaeologist will oversee the Project.[50] If an unanticipated archaeological discovery occurs during offshore construction, Applicant will be required to immediately cease work so an appropriate expert can conduct an evaluation and determine the need for any mitigation measures.[51]

Turning to terrestrial archaeological resources, the majority of onshore Project components have been sited within previously disturbed areas and will therefore avoid archaeological sites and historic properties.[52] Phase 1A Archaeological Surveys were nevertheless prepared in connection with the Onshore Transmission Cable route and the Onshore Interconnection Cable Route.[53] There are no previously recorded archaeological sites located within .25 miles of the latter route; although there are nine previously recorded archaeological sites within .25 miles of the former route, no such cultural resources are located within the Preliminary Area of Potential Effects.[54] A Phase 1B Archaeological Survey submitted with the application did not propose any mitigation or avoidance measures, but noted that certain field investigations

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[48] Ex. 1, Appendices 4-C, 4-D, 4-D1, 4-D2; Ex. 5, p. 4-39.

[49] JP, p. 18.

[50] Ex. 5, pp. 4-46, 4-47, 4-54.

[51] Proposed Certificate Condition 169.

[52] Ex. 5, p. 4-48.

[53] JP, pp. 17-18.

[54] Id.

have yet to be completed due to uncertainty surrounding the location of temporary laydown yards; once these temporary locations are identified, applicant will initiate consultations with the New York State Historic Preservation Office and provide an addendum to the Phase 1B Survey.[55]

The Onshore Converter Station and the Holbrook Substation expansion are the only Project components with the potential to cause visual impacts to above-ground historic resources;[56] as neither will be out of character or scale with the surrounding area as it exists today, any such impact is expected to be negligible.[57]

Finally, impacts to cultural resources will also be minimized or avoided by Proposed Certificate Conditions that restrict construction in undisturbed areas where archeological surveys have not been completed and set forth protocols, as alluded to above, for unanticipated archaeological discoveries that occur during construction.[58]

5. Terrestrial Ecology and Wetlands

a. Vegetation and Wildlife

According to the Joint Proposal, construction-related impacts to terrestrial vegetation and wildlife will be minor and short-term.[59] We agree. In particular, the use of HDD technology eliminates the need for surficial ground disturbance and vegetative clearing within shoreline communities, and it

[55] Id., p. 18.

[56] Each might be visible from one historic property – the Onshore Converter Station from the Waverly Cemetery and the Holbrook Substation from the Sagamore Middle School. See Ex. 5, p 4-46; Ex. 23, pp. 13-14.

[57] JP, p. 17; Ex. 23, pp. 11-12.

[58] JP, pp. 18-19; Proposed Certificate Conditions 168-171.

[59] JP, p. 19.

will thus avoid or minimize impacts in the sea-to-shore transition and Landfall Work areas.[60] Impacts to vegetation adjacent to the Onshore Transmission Cable route have been avoided because the route is located primarily within paved surfaces and existing ROWs; to the extent limited vegetation removal is warranted, it will be minimized. Any necessary tree-clearing similarly will be minimized to the extent practicable, and potential impacts to northern long-eared bats will be avoided pursuant to the procedures set forth in Proposed Certificate Conditions 75(b)(i)-(v).[61] Should it be required, Applicant will develop a Net Conservation Benefit Plan in consultation with DEC and DPS staff.[62]

After construction, operational vegetation management techniques within the Project corridor will be consistent with the Vegetation Management Plan included in the EM&CP, and the Project's ROW will be maintained in compliance with Proposed Certificate Conditions 200, 201, 205, and 208.[63]

b. Invasive Species

To minimize the spread of invasive species arising from the construction, operation or maintenance of the Project, the use of hay is strictly prohibited, and Applicant will prepare an Invasive Species Control and Management Plan in accordance with DEC specifications for inclusion in the EM&CP.[64]

c. Wetlands and Waterbodies

Impacts to DEC-designated tidal, DEC-regulated freshwater, and National Wetland Inventory (NWI)-listed wetlands

[60] Id.

[61] Id., p. 20.

[62] Id.; Proposed Certificate Condition 75(b)(vi).

[63] JP, p. 20.

[64] Id.; Proposed Certificate Conditions 176-177.

will be minimized to the maximum extent practicable due to the use of HDD technology, which, as noted above, eliminates the need for surficial ground disturbance within shoreline communities and adjacent areas.[65] The Applicant is required to include an Inadvertent Returns Plan in the EM&CP to further minimize impacts associated with HDD.[66] In addition, while the Applicant is required to attempt to avoid adverse impacts to wetlands and waterbodies, any activity undertaken in these areas that cannot be avoided must be done in accordance with a Wetland Impact Minimization and Mitigation Plan to be included in the EM&CP.[67] The Applicant is also required to first avoid and then minimize to the maximum extent practicable any impacts to the Coastal Erosion Hazard Area.[68]

The Joint Proposal acknowledges that several mapped DEC-designated tidal wetland categories in the Great South Bay-East Significant Coastal Fish and Wildlife Habitat (SCFWH), including littoral zone and coastal shoals, bars, and mudflats are likely to be affected by the construction of the Project.[69] These tidal wetlands also are mapped by the NWI as estuarine wetlands. Two DEC-regulated Class 1 freshwater wetlands also are expected to be affected at the Carmans River, one of which is also mapped by the NWI as forested and freshwater pond. Impacts to these areas are expected to be localized, minor, and short-term.[70]

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[65] JP, p. 23; Ex. 5.

[66] Proposed Certificate Condition 93.

[67] JP, Appendix S; Proposed Certificate Condition 158.

[68] Proposed Certificate Condition 156.

[69] JP, p. 21.

[70] JP, pp. 21-22. See Proposed Certificate Conditions 87, 89, and 142.

Because of weight restrictions on the William Floyd Bridge, the Applicant must install temporary equipment in the Moriches Bay SCFWH during the construction phase of the Project.[71] The EM&CP will provide an assessment as to how the siting of the equipment avoids or minimizes impacts to the environment to the maximum extent practicable considering alternative methodologies, including impacts to the seafloor, sensitive aquatic vegetation (SAV), and shading.[72] If the Applicant, in consultation with DEC and DPS, determines that existing SAV will be taken during construction, the Applicant is required to implement an SAV Restoration Plan.[73] Moreover, at the conclusion of the construction phase, the equipment must be removed and the site restored to its pre-construction condition.

The fueling of equipment and storage of fuel or other chemicals is prohibited within tidal wetlands and within 100 feet of the tidal wetland boundary. Any fueling or storage areas within 300 feet of any tidal wetland or within the New York State Coastal Area must be identified in the appropriate phase of the EM&CP and properly contained to prevent spills from entering wetlands and waterways.[74]

6. Protected Threatened and Endangered Species

Protected threatened and endangered species potentially affected by the construction and operation of the Project include the Atlantic sturgeon, northern long-eared bat

[71] The equipment may include floating pier sections, floating pier spuds, piles, a transit barge, a crane barge, temporary bridge sections, ramping and an earthen transition pad to meet the Smith Point County Park. JP, p. 22. Alternative locations were explored but determined to be not viable.

[72] JP, p. 22; Proposed Certificate Condition 81.

[73] JP, p. 23; Proposed Certificate Condition 155.

[74] JP, p. 24; Proposed Certificate Condition 163. See also Executive Law §§911 (1), (2).

(NLEB), various federally and State-listed nesting shorebirds (including the piping plover) and raptors (including the peregrine falcon and the osprey), winter flounder, and North Atlantic Right whales. No critical habitat for any federally listed species will be affected by the Project.[75]

If any threatened and endangered species are encountered, the Proposed Certificate Conditions impose various notice and environmental monitoring requirements.[76] If work results in, or is likely to result in, an incidental take of any threatened or endangered species, work must be halted in the area of the take or likely take and the Applicant must submit an Endangered or Threatened Species Mitigation Plan and Implementation Agreement outlining mitigation measures that will result in a net conservation benefit for the affected species.[77] In addition, Proposed Certificate Condition 175 requires the Applicant to develop an Avian Management Plan for rare, threatened, and endangered species as part of its Phase 1 EM&CP to address residual risk to those species.

The Joint Proposal also outlines several time-of-year restrictions for the protection of threatened and endangered species, which we adopt. Except for limited work activities describe in Proposed Certificate Condition 75 (a), no in-water seabed-disturbing work will occur from May 1 to June 20, and September 1 to November 30 to minimize the risk of incidental take of Atlantic sturgeon.[78] No in-water seabed-disturbing work

[75] Ex. 5, p. 4-81.

[76] See Proposed Certificate Condition 75; JP, p. 26. See also 6 NYCRR Parts 182 and 193.

[77] JP, pp. 26-27; Proposed Certificate Condition 174.

[78] JP, p. 25.

will occur in the intracoastal waterway between December 15 and May 31 to avoid impacts to the winter flounder.[79]

For the protection of other threated and endangered marine species, the Applicant is required to comply with federal Bureau of Ocean Energy Management (BOEM) and National Oceanic and Atmospheric Administration (NOAA) requirements for the mitigation, monitoring, and reporting of protected species.[80] Pursuant to Proposed Certificate Condition 180, any sightings of the North Atlantic Right whale must be reported to NOAA within 24 hours.

To mitigate potential noise and other construction impacts on federally and state-listed nesting shore birds, on-beach work is prohibited between April 1 and August 31.[81] Finally, tree-clearing activities will be minimized to the extent practicable to avoid impacts to the habitat of the NLEB. No tree clearing will occur between December 1 and February 28 within 1.5 mile of a NLEB detection and within 5 miles of a NLEB hibernaculum site, and no tree clearing will be permitted at any time within 150 feet of a maternity roost or .25 miles of a hibernaculum.[82]

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[79] JP, p. 26. A Winter Flounder Monitoring and Minimization Plan must be submitted to DEC if installation or decommissioning of Project equipment will occur during that time, and if a taking is to occur, the Applicant must submit a Net Conservation Benefit Plan in accordance with 6 NYCRR Part 182.

[80] JP, p. 26; Proposed Certificate Condition 179.

[81] JP, pp. 25-26; Proposed Certificate Condition 75 (c). Active nests, nest trees, and roosts are provided additional protection. See Proposed Certificate Condition 75 (e).

[82] Proposed Certificate Condition 75 (b). To the extent it becomes necessary to take occupied habitat of the NLEB or individual NLEB, the Applicant will develop a Net Conservation Benefit Plan in coordination with and accepted by DPS and DEC. See JP, pp. 20, 25.

As explained in the Joint Proposal, the appropriate phase EM&CP will list construction activities with anticipated timeframes and identify avoidance and minimization measures for significant concentrations of migrating and overwintering waterfowl near Great South Bay-East and Moriches Bay, and of overwintering and active nest sites for raptors and nesting shorebirds near Carmans River, Great South Bay-East, Moriches Bay, and Smith Point County Park.[83]

7. Benthic Resources and Offshore Water Quality

Although the Export Cable site was selected to avoid sensitive benthic habitats, the Joint Proposal recognizes that the construction, installation, operation, and maintenance activities associated with the Export Cable potentially may cause direct and indirect impacts on other benthic resources and shellfish due to seabed disturbance, noise, and sediment suspension. We agree with the conclusion in the Joint Proposal that these impacts are expected to be minor, localized, and short-term during all the Project's phases. Benthic species and shellfish are expected to recolonize the affected areas after construction has completed, with the HDD exit pit excavation area experiencing a longer recolonization period.

To minimize habitat disruption, the Export Cable will be buried using HDD, a mechanical plow, and a jet plow; the Applicant agreed to abandon the sand wave leveling process that was proposed in the application. The Applicant will include an Anchoring Plan in its EM&CP that will identify how the use of anchoring during construction will impact benthic habitats and outline the parameters for the use of such anchoring.[84] Additionally, the Applicant agreed to reduce the Landfall HDD

[83] JP, p. 27; Proposed Certificate Condition 157.

[84] Proposed Certificate Condition 83. See also JP, Appendix E.

bores from three to one to further reduce the potential impact on benthic resources.[85]

In addition, the Joint Proposal includes a draft Benthic Monitoring Plan, developed in accordance with BOEM's Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf to assess the baseline benthic conditions prior to the export cable installation and to subsequently monitor post-installation impacts.[86] Impacts caused by suspended sediment and sediment deposits will be monitored and mitigated through the implementation of a Suspended Sediment and Water Quality Monitoring Plan as part of the EM&CP.

8. Onshore Water Quality

We agree with the conclusion in the Joint Proposal that no long-term impacts to onshore water quality are expected because of the construction, operation, or potential decommissioning of the Project. To preserve water quality, Proposed Certificate Condition 181 requires the Applicant to comply with the water quality standards set forth in 6 NYCRR Parts 701 through 704 and Sections 301, 302, 303, 306, and 307 of the federal Clean Water Act.[87] In addition, the Applicant is required to comply with any conditions contained in a Water Quality Certification issued pursuant to Section 401 of the federal Clean Water Act.

9. Impacts Related to Construction of Export Cable

The Applicant has committed to various design changes with respect to the Export Cable that has allowed the Project to be installed at the Landfall HDD with a single bore instead of

[85] JP, pp. 42-43.

[86] JP, Appendix N. See Proposed Certificate Conditions 140-141.

[87] See 33 USC Parts 1311, 1312, 1313, 1313a, and 1317.

three, as proposed in the application. The Joint Proposal indicates that these design changes significantly reduce the environmental impacts associated with the Project, including impacts to benthic resources and water quality.[88] The installation of the Export Cable will not affect the tide and current conditions in vicinity of the Project since the cable will be below the seabed at a depth of at least six feet.[89] All drilling operations associated with the Export Cable are required to be done in accordance with time-of-year restrictions contained in the Proposed Certificate Conditions to minimize impacts to residents, businesses, and threatened and endangered species.[90]

The Joint Proposal requires the Applicant to adhere to total suspended solids (TSS) limits and, to that end, the Applicant is required to conduct jet trencher trials to calibrate the Export Cable installation tools to minimize turbidity, complete a Suspended Water Sediment and Water Quality Monitoring Plan, and stop work if the TSS limits are exceeded at the edge of the 1,500-foot mixing zone.[91] Finally, the Applicant is required to include a cable monitoring and management plan, developed in consultation with DPS, DEC, and DOS, as part of the post-Phase 1 EM&CP.[92]

10. Electric and Magnetic Fields

Electric and magnetic fields (EMF) occur naturally and are produced by power lines during operation. Each electrical element of the Project, including the Export Cable, the Onshore

[88] JP, pp. 43-44.

[89] Proposed Certificate Condition 80.

[90] Proposed Certificate Conditions 72-78.

[91] JP, pp. 44-45; Proposed Certificate Conditions 187-188, 193.

[92] JP, p. 45; Proposed Certificate Conditions 138-139.

Transmission Cable, Onshore Interconnection Cable, and the Onshore Converter Station, could be sources of EMF. Results of the Applicant's EMF study demonstrate that the EMF levels for the Project will be within the standards articulated in the Commission's Interim Policy Statement.[93] The buried nature of the cables will help minimize EMF levels, as the EMF from buried cables is blocked by cable insulation, armoring, and the earth.[94]

Further, the Applicant is required to conduct certain post-construction bathymetric measurements, analysis of as-built installation plan and profile drawings and maps to validate the EMF modeling results, and offshore magnetometer measurements to confirm compliance with the above standards.[95]

D. Impacts to Fisheries and Commercial Fishing

Potential impacts of the construction and operation of the Project to the commercial and recreational fishing activities include temporary and limited displacement of fishers and fishing gear loss. The Applicant has committed to provide notice to DEC-licensed fishers, as well as staff at DPS, DEC, DOS, and DAM, of updates regarding in-water construction work, such as seabed preparation, HDD and HDD exit pit installation, and cable installation.[96] These notices will include, among other information, the general dates of the work, an NOAA work zone chart identifying the general vicinity of the work, and contact information for the employee or agent of the Applicant with knowledge of the work.

We find that the Joint Proposal and Proposed Certificate Conditions will avoid or minimize Project-related

[93] Ex. 5, pp. 4-212 through 4-217. See also Ex. 23.

[94] Ex. 5, p. 4-213.

[95] See JP, pp. 37-38; Proposed Certificate Conditions 22-24.

[96] See JP, Appendix J.

impacts to commercial and recreational fishing activities to the extent practicable. The Joint Proposal contains numerous provisions safeguarding the marine environment and requiring notice and outreach to the fishing community.[97] Notably, LICFA, which expressed concerns for and an interest in commercial fishing activities in and near the Project, was an active participant in this proceeding, including settlement negotiations, and is a signatory to the Joint Proposal.

In addition, the Applicant will submit a Fisheries Compensation Plan with the EM&CP, as outlined in Proposed Certificate Condition 60. This plan will identify a claims process for commercial fishers' gear loss and compensation during all phases of the Project. We find that the Fisheries Compensation Plan will appropriately compensate for lost gear.

Finally, Applicant has agreed to a Fisheries Monitoring Plan which will work to ensure that impacts to fisheries and fishing operations are appropriately minimized.[98]

E. Impacts to Transportation

Project impacts to transportation are identified and discussed in paragraphs 88 to 102 of the Joint Proposal, as well as in Proposed Certificate Conditions 17, 43, 73, 80, 82, 84, 90, 95, 107, 110, and Application Exhibit E-6.[99] We agree with the conclusion in the Joint Proposal that the construction and operation of the Project is not anticipated to have any permanent impacts on airports, railways, roadways, pedestrian walkways, and marine navigation.

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[97] See, e.g., Proposed Certificate Conditions 80, 88, 92, 137, 192.

[98] See Proposed Certificate Conditions 142 through 147; JP, Appendix O.

[99] Exs. 16, 26.

There are three airports and one heliport near the Project Corridor. Vertical construction associated with the onshore converter station and the Holbrook Substation will not exceed 85 feet and will not interfere with air traffic or air traffic communications, and the Applicant will work with the Federal Aviation Administration (FAA) to identify any impacts to air traffic navigation. Any mitigation measures required by FAA will be included in the EM&CP. After the Project design is finalized and set forth in the approved EM&CP, we require Applicant to obtain and provide evidence of the FAA determination that the final design of the structures proposed for the Project will have no impact on the affected airports or will have impacts mitigated by modifications to the final design as directed or accepted by the FAA.

The Onshore Transmission Cable will be located primarily in existing public road ROWs and will cross several public roads. Construction will require temporary isolated and/or partial road closures that may result in traffic delays, congestion, and narrow roadways. The Applicant intends to maintain at least one travel lane of traffic in the section(s) of DOT roads in which construction crews are working. Trenchless crossings are planned at several crossing locations to minimize impacts to traffic, including at the Sunrise Highway. Six Suffolk County public bus routes are expected to be affected by temporary lane closures during construction of the onshore transmission cable.

A Maintenance and Protection of Traffic (MPT) Plan would be developed for all roadways affected by construction activities, and the MPT Plan traffic control measures would be incorporated into the EM&CP. In addition, DOT requires a Highway Work Permit (HWP) and a Use and Occupancy Permit (U&O)

to install utilities within or adjacent to State highways.[100] Following final design and preparation of the Phase 1 EM&CP, the Applicant must obtain any necessary HWP and U&O from DOT.

Pipe stringing will occur at Burma Road and the Joint Proposal concludes that pedestrian access to the nearby campground, park, or beach access will not be hindered. Two public parking lots will be used during the construction of the Onshore Transmission Cable, but use of these parking lots is not expected to hinder recreational use of the lots during peak seasonal use since the existing parking space will not be reduced.[101] All construction-related impacts to pavement, curbs, and sidewalks must be restored to their pre-construction condition, or better, or as agreed-upon with the relevant local government.

The Onshore Transmission Cable will cross the Long Island Railroad (LIRR) at two locations: along the LIRR Montauk Branch at Church Road, and along the LIRR Ronkonkoma Branch near Manor Road. Trenchless crossing techniques, to be detailed in the EM&CP, will be utilized at these crossings to minimize Project construction and operation impacts. Applicant is required to coordinate with the LIRR to avoid interference with railroad signaling and communications.

The Export Cable and the Onshore Transmission Cable will be in waters along the coast of Long Island that are used for commercial and recreational marine vessel traffic. The Onshore Transmission Cable will cross the intracoastal waterway via HDD to minimize and avoid impacts to the intracoastal waterway. Cables will be buried to a depth of at least six feet to reduce the chances for interactions with commercial vessels.

[100] 17 NYCRR Parts 126, 127, and 131.

[101] The parking lots to be used are at the Smith Point County Park and the Smith Point Marina. JP, p. 31.

There are no Aids to Navigation within the Export Cable or Onshore Transmission Cable corridors. As required by Proposed Certificate Condition 95, all Project construction activities will be closely coordinated with applicable local, State, and Federal agencies, including the United States Army Corps of Engineers and United States Coast Guard. We agree with the conclusion in the Joint Proposal that the Project design, construction schedule, and construction techniques, as set forth in Proposed Certificate Conditions 80 and 90, will minimize impacts to navigable waterways.

F. Impacts to Communication Systems

Forty-seven registered commercial telecommunications towers are located within one mile of the Project, including antenna structures and microwave towers but not towers for cellular telephone, FM radio, land-to-mobile transmission, or TV stations. The Project will cross the Apollo North submarine telecommunication cable near the Landfall Work Area. Proposed Certificate Condition 72 identifies requirements regarding facility crossings, co-locations, construction within the existing easements, and machinery crossings.

We agree with the conclusion in the Joint Proposal that the construction and operation of the Project is not expected to have impacts on communications and that the Project will comply with the latest version of the National Electrical Safety Code related to appropriate spacing between power and communication cables. The Certificate Holder will be required to resolve any confirmed interference with communication facilities.

G. Noise Impacts

With limited exceptions, including efforts to comply with DOT specifications or contractual restrictions,

construction will be permitted only between 7:00 A.M. and 7:00 P.M. on Monday through Saturday. While residents and businesses may be temporarily affected by construction activities, the Applicant will implement and track noise mitigation measures to ensure that exposure to significant noise levels will not occur for an extended period.[102] Such measures include the Construction Noise Control Plan, the Specifications for Computer Noise Modeling and Tonal Evaluation, and the Sound Testing Compliance Protocol.[103]

The Application also includes an Onshore Acoustic Assessment, which indicates that noise is not expected to be generated from the operation of the Export Cable, Onshore Transmission Cable, Onshore Interconnection Cable, or expansion of the Holbrook Substation.[104] To the extent that operation of the Onshore Converter Station will produce noise, related control features and design requirements are set forth in Proposed Certificate Conditions 47-50.[105]

H. Availability and Impacts of Alternatives

The Signatory Parties assert that the Project as described above and in Appendix B is preferable to any potential alternatives; indeed, they maintain that the selected route has been designed to minimize impacts to residents, traffic, wetlands, maritime industries, businesses, recreational activities, and natural resources.[106]

Multiple alternatives were nevertheless evaluated for optimal achievement of the Project's purpose – generally, the

[102] JP, p. 36.

[103] JP, Appendices K, L and M, respectively.

[104] JP, p. 37; Ex. 18, revised Appendix 4-I, p. 13.

[105] JP, p. 37.

[106] JP, p. 46.

advancement of the State's clean energy goals as set forth in the CLCPA and, particularly, the delivery of up to 924 MW of offshore wind energy through a point of interconnection at the Holbrook Substation.[107]

While four sites were considered for the new Onshore Converter Station, three would need extensive tree clearing or were deemed too far from the Holbrook Substation.[108] The chosen site is minimally vegetated and is closer to both the Substation and other industrial developments.[109] The route for the Onshore Transmission Cable was selected from five alternatives, primarily because it is situated in an existing ROW where it will have limited impact on sensitive resources.[110]

The route of the Landfall HDD arose out of a desktop analysis that considered available oceanographic and geologic information, as well as the location of existing cables, shipwrecks, artificial reefs, and sand borrow pits.[111] Two potential corridors were identified – one involving a Long Island Sound approach and the other an approach from the Atlantic Shore.[112] The latter was selected because of certain constraints in the Long Island Sound, including a higher concentration of shipwrecks and the presence of both natural rock reefs and numerous significant habitat designations.[113] Smith Point County Park was specifically chosen from six alternatives because it offered sufficient space to accommodate

[107] Ex. 4, p. 3-3; JP, p. 46.

[108] Ex. 4, pp. 3-5 to 3-7; JP, p. 46.

[109] JP, pp. 46-47.

[110] Ex. 4, pp. 3-9 to 3-12; JP, p. 47.

[111] JP, p. 47.

[112] Ex. 4, p. 3-7.

[113] Id.

onshore operations, with minimal impacts to adjacent land uses, and natural or cultural uses.[114]

We agree with the Signatory Parties' assertion that the Project as designed is preferable to the potential alternatives; we likewise agree that "no action" is not a viable option considering New York's climate action and clean energy goals.

I. Conformance with State and Local Laws

According to the Joint Proposal, the Project fully complies with the substantive provisions of all applicable state laws, including the PSL, the ECL, and the Agriculture and Markets Law.[115]

Pursuant to the Commission's rules, Exhibit 7 of the application sets forth all of the local ordinances that are applicable, or potentially applicable, to the Project.[116] While Sunrise indicates that it will construct and operate the Project in conformance with most of these laws, it does request that certain provisions be waived by the Commission pursuant to its authority under PSL Article VII.[117] The Joint Proposal specifically identifies (i) fencing and screening requirements, (ii) maximum height restrictions, and (iii) local rules governing noise levels and dust emissions as examples of subject matter for which waivers are sought.[118] The rationales underlying these requests for relief are also asserted in the Joint Proposal; in summary, compliance would be technologically

[114] Id., p. 3-8; JP, p. 47.

[115] JP, p. 48.

[116] 16 NYCRR §86.8; Applicant submitted revisions to Exhibit 7 on April 12, 2021, and April 22, 2022.

[117] Exs. 8, 18.

[118] JP, pp. 49-50.

impossible, unsafe, or "impracticable from a cost and economics perspective."[119]

As indicated above, Exhibit 7 includes the full list of local laws for which Applicant seeks a waiver or partial waiver. These are as follows: Suffolk County Chapter 245 – Utility Easements; Chapter 618 – Noise; Chapter 639 – Parking, Offstreet; Chapter 643 – Parks and Park Facilities; Chapter 717 – Scaffolds; Chapter 759 - Storm Sewers; Chapter 948 – Highway Work Fees; Town of Brookhaven Chapter 8 – Bay and Harbor Bottoms; Chapter 9 – Beaches; Chapter 13 – Boat Control; Chapter 16 – Building Construction Administration; Chapter 16A – Electrical Code; Chapter 30 – Fire Prevention; Chapter 33 – Flood Damage Prevention; Chapter 35 – Grading; Chapter 38 – Highways; Chapter 50 – Noise; Chapter 53 – Sand and Gravel Pits, Excavation, Removal of Topsoil; Chapter 57 – Shellfish; Chapter 57A – Signs Permitted in all Districts; Chapter 70 – Tree Preservation; Chapter 75 – Vegetation on Beach Areas; Chapter 76 – Coastal Erosion Hazard Areas; Chapter 78 – Water Resources; Chapter 80 – Critical Environmental Areas, SEQRA Implementation; Chapter 81 – Wetland and Waterways; Chapter 85 – Zoning; Chapter 86 – Stormwater Management and Erosion Control; Chapter 86A – Prohibition of Illicit Discharge and Connections to Town of Brookhaven Municipal Separate Storm Sewer System.[120]

Here again, the justification underlying each waiver request is provided; in many instances, the local requirements are preempted by PSL §130, while in others they are deemed unduly restrictive due to existing technology or economic

[119] Id.

[120] Exs. 8, 18.

factors.[121] Notably, neither Suffolk County nor the Town of Brookhaven objects to Sunrise's waiver requests.[122]

J. Conformance with Long-range Plans for the Electric Grid

The Project is consistent with the New York Independent System Operator's (NYISO) planning objectives and requirements and will advance New York's efforts to achieve the environmental and renewable energy goals established in the CLCPA.[123]

K. System Reliability Impact Study

A System Reliability Impact Study (SRIS) issued on November 17, 2020, concluded that the Project would have no significant adverse impact on the reliability and operating characteristics of the New York State transmission system that could not be mitigated by normal NYISO operating procedures or system upgrade facilities. A second SRIS, prompted by a minor design change, was issued on February 23, 2021; it reached a similar conclusion.[124]

L. Certificate Conditions

The Signatory Parties' Proposed Certificate Conditions appear in Appendix D to the Joint Proposal. There are 24 categories of conditions consisting of: Conditions of the Order; Laws and Regulations; Public Health and Safety; Environmental Management and Construction Plan Process; Environmental Management and Construction Plan Contents; Notices and Public Comments; Construction and Maintenance Windows and Timing;

[121] Ex. 18, revised Exhibit 7, p. 7-2.

[122] Ex. 21.

[123] Ex. 18, revised E4, pp. 4-2 to 4-4.

[124] Ex. 18, Revised E4, p. 4-4 (confidential deficiency response No. 22, submitted April 12, 2021).

SRWEC-NYS Construction; Onshore Transmission Cable Construction; Contractors and Contractor Supplies/Materials; Oversight and Supervision; Roads and Transportation; Monitoring and Mitigation; Onshore Erosion Control and Soil Handling; Water Resources; Cultural Resources; Terrestrial and Wildlife Resources; Invasive Species; Marine Resources; Water Quality; Handling of Petroleum & Hazardous Substances; Vegetation Management and Herbicide, Fungicide, and Pesticide Use; Restoration Activities; and Decommissioning.

In total, there are 210 conditions in Appendix D, some of which are multi-part. These Proposed Certificate Conditions comprehensively reflect the Signatory Parties' agreements as set forth in the body of the Joint Proposal. They adequately protect public health and are otherwise in the public interest, as they minimize the Project's potential adverse impacts to the maximum extent practicable.

M. Miscellaneous

The Joint Proposal contains several paragraphs labelled "General Provisions."[125] These paragraphs, 1 through 11, consist of agreements by and among the signatories to the Joint Proposal - they are self-executing and do not require any Commission action.

IV. CONCLUSION AND COMMISSION FINDINGS

The Joint Proposal filed here is supported by Sunrise, staff of DPS, DEC, DAM, DOS, DOT, and by LICFA, all of which have been active participants throughout this proceeding. It is clear, and we so find, that the parties have adhered to our settlement rules and guidelines in producing a Joint Proposal that addresses all the statutory and regulatory issues

[125] JP, pp. 5-7.

surrounding Sunrise's request for a Certificate to construct, operate, and maintain the Project. In particular, the Joint Proposal considers the probable environmental impacts of the Project and details the steps necessary to ensure that any such adverse impacts are minimized to the extent practicable given currently available technology and the nature and economics of potential alternatives.

As discussed throughout this order, the Project will assist New York's efforts to achieve those clean energy and environmental goals set forth in the CLCPA; accordingly, a finding of public need is fully supported by the record.

The Joint Proposal contains additional proposed findings in Appendix C. These findings are detailed and well-supported by the record; accordingly, we adopt them as our own and incorporate them here by reference.

Considering all the above, we grant the Applicant a Certificate of Environmental Compatibility and Public Need subject to the discussion in this order and the Certificate Conditions in Appendix D to the Joint Proposal.

The Commission orders:

1. The terms of the Joint Proposal filed on September 23, 2022 (Attachment A to this Order), including the conditions in Appendix D, subject to the discussion in the body of this Order, are adopted and incorporated into and made a part of this Order.

2. Applicant's motion for Commission waiver of certain local laws as identified in the application and in the body of this Order is granted.

3. This proceeding is continued.

By the Commission,

(SIGNED) MICHELLE L. PHILLIPS
Secretary

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Application of Sunrise Wind LLC for a Certificate of Environmental Compatibility and Public Need for the Construction of Up to 6.2 Miles (320 kilovolt [kV]) of Direct Current (DC) Submarine Export Cable from the New York State Territorial Waters Boundary to the Smith Point County Park on Fire Island in the Town of Brookhaven in Suffolk County and Up to 17.5 Miles (320 kV) of Onshore Transmission Cable from the Landfall at Fire Island to a New Onshore Converter Station in the Town of Brookhaven and Up to 1 Mile (138 kV) of Alternating Current (AC) Onshore Interconnection Cable Connecting to the Existing Holbrook Substation in the Town of Brookhaven in Suffolk County	Case 20-T-0617

JOINT PROPOSAL

By: Sunrise Wind LLC
Staff of the Department of Public Service
Department of Environmental Conservation
Department of Agriculture and Markets
Department of State
Department of Transportation
Long Island Commercial Fishing Association

Dated: September 6, 2022

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STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Application of Sunrise Wind, LLC for a Certificate of Environmental Compatibility and Public Need for the Construction of Up to 6.2 Miles (320 kilovolt [kV]) of Direct Current (DC) Submarine Export Cable from the New York State Territorial Waters Boundary to the Smith Point County Park on Fire Island in the Town of Brookhaven in Suffolk County and Up to 17.5 Miles (320 kV) of Onshore Transmission Cable from the Landfall at Fire Island to a New Onshore Converter Station in the Town of Brookhaven and Up to 1 Mile (138 kV) of Alternating Current (AC) Onshore Interconnection Cable Connecting to the Existing Holbrook Substation in the Town of Brookhaven in Suffolk County	Case 20-T-0617

JOINT PROPOSAL

This Joint Proposal (the Joint Proposal), which includes Appendices A through S attached hereto and made a part hereof, is made as of September 6, 2022, by and between Sunrise Wind LLC (Sunrise Wind or the Applicant), Staff of the New York State Department of Public Service (DPS Staff), the New York State Department of Environmental Conservation (NYSDEC), the New York State Department of Agriculture and Markets (NYSAGM), the New York State Department of State (NYSDOS), the New York State Department of Transportation (NYSDOT), and the Long Island Commercial Fishing Association (LICFA) (individually, a Signatory Party and collectively, the Signatory Parties).

INTRODUCTION AND PROCEDURAL HISTORY

On December 9, 2020, Sunrise Wind filed an application to the New York Public Service Commission (the Commission) pursuant to Article VII of the Public Service Law (the PSL) and the rules and regulations promulgated thereunder for a Certificate of Environmental Compatibility and Public Need (the Application) to construct, operate, and maintain the Sunrise Wind Cable Project (the Project). Subsequently, on April 12, 2021 and June 2, 2021, Sunrise Wind filed

supplemental information to the Application. On January 28, 2022 and February 16, 2022, Sunrise Wind filed additional amendments to the Application concerning the Project's onshore and offshore components, respectively. Finally, on April 22, 2022, Sunrise Wind filed a supplement to the Application related solely to the Project's interconnection to the Long Island Power Authority's (LIPA) existing Holbrook Substation (the Holbrook Supplement) (together, the Application and all subsequent amendments and supplements are referred to herein as the Application, the contents of which are detailed in Appendix A).

As described in the Application, the Project consists of: (i) one high-voltage direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 5.2 miles (mi) (8.4 kilometers [km]) in length in New York State (NYS or State) waters and up to 1,054 feet (ft) (321 meters [m]) located onshore (*i.e.*, above the Mean High Water Line [MHWL], as defined by the United States Army Corps of Engineers [USACE] [33 Code Federal Regulations (CFR) 329]) and underground, up to the transition joint bay (TJB) (the SRWEC–NYS); (ii) a DC underground transmission circuit (320 kV) up to 17.5 mi (28.2 km) in length primarily within existing roadway rights-of-way (ROW) and concrete and/or direct buried splice vaults and associated components (the Onshore Transmission Cable); (iii) an onshore converter station that will transform the Project's voltage to from 320 kV DC to 138 kV alternating current (AC) (the OnCS–DC); (iv) two AC underground circuits (138 kV) approximately 1.1 mi (1.8 km) in length, which will connect the new OnCS–DC to LIPA's existing Holbrook Substation (the Onshore Interconnection Cable); (v) fiber optic cables co-located with both the Onshore Transmission Cable and Onshore Interconnection Cable; (vi) temporary laydown yards; and (vii) the expansion of the Holbrook Substation to accept the Onshore Interconnection Cable (the Holbrook Substation Expansion). The onshore components of the Project will traverse the Town of Brookhaven (the Town) in Suffolk County (the County).

On March 22, 2021, the Commission issued an Order granting the Applicant's motion seeking waivers[1] and on July 1, 2021, the Secretary to the Commission (the Secretary) filed a letter in this proceeding confirming that the Application was in compliance with PSL § 122.[2] Thereafter, by letter dated July 2, 2021, the Secretary issued a *Notice of Availability of Intervenor Funding* and a *Notice of Procedural Conference* to be held before Administrative Law Judges (ALJs) Erika Bergen and Michael Clarke, the presiding ALJs in this proceeding. On July 8, 2021, ALJ's Bergen and Clarke issued a *Ruling Adopting Protective Order*.[3] On July 20, 2021, LICFA submitted a Request for Intervenor Funds.[4] Following the July 21, 2021 procedural conference, LICFA submitted an Amended Request for Intervenor Funds,[5] which Sunrise Wind opposed.[6] ALJs Bergen and Clarke issued a *Ruling on Party Status and Intervenor Funding* providing LICFA with intervenor funding.[7] Subsequently, on August 20, 2021, ALJs Bergen and Clarke issued a *Ruling on Intervenor Funding* making certain amendments to the intervenor funding award to LICFA.[8] ALJs Bergen and Clarke further amended LICFA's intervenor funding award in September 2021[9] and April 2022.[10]

[1] Case 20-T-0617, *Application of Sunrise Wind LLC for a Certificate of Environmental Compatibility and Public Need for the Construction of Up to 6.2 Miles (320 kilovolt [kV]) of Direct Current (DC) Submarine Export Cable from the New York State Territorial Waters Boundary to the Smith Point County Park on Fire Island in the Town of Brookhaven in Suffolk County and Up to 17.5 Miles (320 kV) of Onshore Transmission Cable from the Landfall at Fire Island to a New Onshore Converter Station in the Town of Brookhaven and Up to 1 Mile (138 kV) of Alternating Current (AC) Onshore Interconnection Cable Connecting to the Existing Holbrook Substation in the Town of Brookhaven In Suffolk County*, Order on Waiver Requests (Issued Mar. 22, 2021).
[2] Case 20-T-0617, *supra*, Letter from Secretary Phillips Regarding Application Compliance (Filed July 1, 2021).
[3] Case 20-T-0617, *supra*, Ruling on Protective Order (Issued July 8, 2021).
[4] Case 20-T-0617, *supra*, LICFA Request for Intervenor Funds (Filed July 20, 2021).
[5] Case 20-T-0617, *supra*, LICFA Amended Request for Intervenor Funds (Filed July 27, 2021).
[6] Case 20-T-0617, *supra*, Sunrise Wind Opposition to LICFA Intervenor Funding Request (Filed July 28, 2021).
[7] Case 20-T-0617, *supra*, Ruling on Party Status and Intervenor Funding (Issued Aug. 5, 2021).
[8] Case 20-T-0617, *supra*, Ruling on Intervenor Funding (Issued Aug. 20, 2021).
[9] Case 20-T-0617, *supra*, Ruling on Intervenor Funding (Issued Sept. 13, 2021).
[10] Case 20-T-0617, *supra*, Ruling on Motion (Issued April 19, 2022).

Before filing the Application and during the pendency of this proceeding, the Applicant's public outreach team has conducted a variety of outreach efforts to ensure the crossed communities, abutters, and other stakeholders are aware of the Project.[11]

On August 13, 2021, Sunrise Wind filed a notice of impending settlement negotiations, noticing the first settlement meeting in this proceeding for September 10, 2021. After eleven months of bi-weekly settlement meetings and various technical sessions, the Signatory Parties—which includes every party actively involved in settlement in this proceeding aside from PSEG Long Island LLC on behalf of and as an agent for LIPA ("PSEG"), which does not oppose this Joint Proposal—agreed to the terms of this Joint Proposal dated September 6, 2022.

As demonstrated below, the Joint Proposal gives fair and reasonable consideration to the interests of all parties and its approval by the Commission is in the public interest. Further, the Joint Proposal ensures an appropriate balance to protect impacted stakeholders; is consistent with sound environmental, social, and economic policies of the Commission and the State; and produces an outcome that is within the range of reasonable results that would likely have arisen from a Commission decision in a litigated proceeding, as described in the settlement guidelines in Case 90-M-0255.[12]

[11] *See* Point IV (G), *infra*.
[12] *See* Case 90-M-0255 et al., *Proceeding on Motion of Commission Concerning its Procedures for Settlement and Stipulation Agreements, filed in C 11175*, Opinion, Order and Resolution Adopting Settlement Procedures and Guidelines (Issued Mar. 24, 1992).

TERMS OF THE JOINT PROPOSAL

I. General Provisions

1. The support of the Signatory Parties for this Joint Proposal is expressly conditioned upon the Commission's approval of all provisions thereof, including appendices, without material change or condition. If the Commission does not adopt the terms of this Joint Proposal, the Signatory Parties are free to pursue their respective positions in this proceeding without prejudice.

2. The Signatory Parties agree to submit this Joint Proposal to the Commission along with a request that the Commission adopt the Joint Proposal's terms and provisions as set forth herein, including the Certificate Conditions attached as **Appendix D**. The Signatory Parties recognize that certain provisions of this Joint Proposal contemplate actions to be taken in the future to fully effectuate this Joint Proposal (*e.g.*, issuance of the Construction and Operations Plan [COP] approval by the Bureau of Ocean Energy Management [BOEM] and approval by FHWA for an exception to the New York State Utilities Accommodation Plan). Accordingly, the Signatory Parties agree to cooperate with each other in good faith in participating in and refraining from taking any action(s) or position(s) in these or any other federal proceedings or approvals related to the siting or other environmental impacts of the Project that would conflict with the construction and operation of the Project as agreed to in this Joint Proposal, with the exception of the authority and responsibilities of the NYSDOS pursuant to Article 42 of the Executive Law and the federal consistency review requirements of the Coastal Zone Management Act (16 USC § 1451 *et seq.*) and the authority and responsibilities of NYSDOT in New York State Highway Law § 52 and 17 NYCRR Parts 126, 127 and 131, together with the necessary approval of the Federal Highway Administration pursuant to 23 U.S.C. § 109, 23 CFR 645 Subpart B, and the National Environmental Policy Act 42 U.S.C. § 4321 et seq.

3. The Joint Proposal's terms and provisions apply solely to, and are binding only in, the context of the present PSL Article VII proceeding and do not necessarily reflect the position any Signatory Party would take in any future proceeding. Each Signatory Party reserves the right in future PSL Article VII proceedings to propose or include such terms and conditions as it may deem appropriate.

4. Sunrise Wind's construction, operation, and maintenance of the Project will comply with the Joint Proposal, the proposed Certificate Conditions (set forth in Appendix D, *infra*), PSL Article VII, and with the substantive provisions of applicable State laws.

5. The discussions that produced this Joint Proposal have been conducted with the explicit adherence to 16 NYCRR § 3.9 (d), that any discussions among the Signatory Parties with respect to this Joint Proposal prior to its execution and filing shall not be subject to discovery or admissible as evidence.

6. Except as expressly provided in Paragraph 9 of this Joint Proposal, nothing in this Joint Proposal or any attached appendices is intended to directly impose any obligations on or limit any pre-existing rights of any of the parties other than the Applicant.

7. Any disagreement over the interpretation of this Joint Proposal or implementation of any of its provisions that cannot be resolved informally among the Signatory Parties shall be resolved in the following manner:

a. The Signatory Parties shall promptly convene a conference and make good-faith attempts to resolve any such disagreement; and

b. If such disagreement cannot be resolved by the Signatory Parties, any Signatory Party may petition the Commission for resolution of the disputed matter.

8. This Joint Proposal is not a waiver of the Applicant's rights to apply for additional or modified permits, approvals, or certificates from the Commission or any other agency.

9. Nothing in this Joint Proposal shall be construed as either waiving or expanding in any way the authority of any State agency to enforce the laws and regulations that are the subject of its jurisdiction.

10. All Signatory Parties fully support the Commission's approval of the Joint Proposal in its entirety. The Signatory Parties recognize this Joint Proposal may require future actions by various parties and agree to undertake, in good faith, these future actions.

11. This Joint Proposal is being executed in counterpart originals and shall be binding on each Signatory Party when the counterparts have been executed. All signatories have the necessary authority to execute this Joint Proposal on behalf of the Signatory Party that they represent.

II. Evidentiary Record

12. **Appendix A** of this Joint Proposal lists the testimony, exhibits, and other evidence that the Signatory Parties agreed to be admitted as record evidence in this proceeding (collectively, the Evidentiary Record). The Evidentiary Record also includes responses to certain information requests (IRs) produced in this proceeding that contribute accurate, material, and relevant information to the Evidentiary Record in support of the Project described in this Joint Proposal.

III. Project Description

13. The Signatory Parties agree that the Description of Project set forth in **Appendix B**, attached hereto, accurately describes the Project's location, configuration, and ownership as the

Signatory Parties recommend the Commission to approve the Joint Proposal, including Appendix B. Appendix B includes a detailed description of the Project's components, as well as the corridor that the Project will be sited within (the Project Corridor).

IV. Environmental Compatibility and Public Need

14. The Commission must consider several factors in making its determination of environmental compatibility and public need pursuant to PSL § 126, including the proposed facility's basis of need; the nature of probable environmental impacts; that the facility avoids or minimizes to the extent practicable any significant adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, and other pertinent considerations including but not limited to, the effect on agricultural lands, wetlands, parklands, and river corridors traversed; that the facility avoids or minimizes to the extent practicable any significant adverse impact on active farming operations that produce crops, livestock and livestock products, considering the state of available technology and the nature and economics of various alternatives, and the ownership and easement rights of the impacted property; availability and impacts of alternatives and undergrounding considerations; conformance to the State's long-range plans; conformance with State and local laws; and service of the public interest, convenience, and necessity.

15. The resolution of each of these factors, plus other information the Commission may find useful in its assessment, are described below in detail and confirm that this Joint Proposal meets the standard in PSL § 126.

A. The Project's Basis of Need

16. As described in Exhibits 3 and E-4 of the Application (Evidentiary Record Exhibits 4 and 14), the purpose of the Project is to transmit electricity from the Sunrise Wind Farm (SRWF)

for delivery to the LIPA-owned and existing Holbrook Substation in order to provide clean, reliable offshore wind energy to increase the amount and availability of renewable energy to the State while creating the opportunity to displace electricity generated by fossil fuel-powered plants and offer substantial economic and environmental benefits.

17. In 2014, the State launched Reforming the Energy Vision (REV), a comprehensive energy strategy that strives to make energy more affordable, build a more resilient energy system, improve existing initiatives and infrastructure, create jobs and business opportunities, and protect the environment. Further, REV is focused on building an integrated energy network able to harness the combined benefits of the central grid with clean, locally generated power.

18. In 2015, the State adopted the 2015 NYS Energy Plan (SEP) to serve as a roadmap to advance the REV agenda. Among other clean energy goals, the SEP set forth the State's long-term goal to provide 50 percent of its electricity from renewable sources by 2030 (the 50 by 30 goal).[13] The SEP included an offshore wind initiative to encourage long-term and strategic regulatory coordination for large-scale offshore wind projects, resulting in the Commission's issuance of an order implementing a Clean Energy Standard (CES).[14] The CES Order requested the New York State Energy Research and Development Authority (NYSERDA) to lead a research, analysis, and outreach program to evaluate the potential for offshore wind energy in the State,[15] which resulted in the publication of the Offshore Wind Master Plan,[16] as well as a report titled "Offshore Wind Policy Options" (the Options Paper). The Options Paper served as a roadmap for meeting the State's goal—announced in 2017—of having 2,400 MW of offshore energy generated

[13] New York State Energy Planning Board, 2015 New York State Energy Plan. Volume 1: The Energy to Lead, available at: https://energyplan.ny.gov/Plans/2015 (last accessed Mar. 3, 2022).
[14] See Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Order Adopting a Clean Energy Standard (Issued Aug. 1, 2016) (CES Order).
[15] *Id.* at 103.
[16] *See* Offshore Wind Master Plan, available at: https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/About-Offshore-Wind/Master-Plan (last accessed Mar. 3, 2022).

by 2030. In 2018, as a result of the Options Paper and completion of a Generic Environmental Impact Statement (GEIS),[17] the Commission issued an order adopting the Offshore Wind Standard,[18] which set the stage for the State's first phase of procurements for offshore wind.

19. Subsequently, NYSERDA issued a competitive request for offshore wind proposals, and Sunrise Wind's proposal was one of two selected. Based on this selection, in October 2019, the Applicant executed a contract with NYSERDA for a 25-year Offshore Wind Renewable Energy Certificate (OREC) related to the SRWF and the Project (the OREC Agreement). Under the OREC Agreement, NYSERDA will purchase ORECs generated by the operational SRWF and make those available for purchase by load-serving entities within the State. The SRWF and the Project are being developed to fulfill Sunrise Wind's obligations to NYSERDA in accordance with the OREC Agreement. As specified in the OREC Agreement, the Project will transmit electricity from the SRWF, located in a federal lease area, for delivery to LIPA's existing Holbrook Substation.

20. Therefore, the SRWF and the Project will assist the State in achieving its nation-leading clean energy and environmental goals set forth in the REV, CES, and codified within the Climate Leadership and Community Protection Act (CLCPA), which was enacted in July 2019. Under the CLCPA, it is the State's goal to reduce greenhouse gas emissions from all anthropogenic sources 100% over 1990 levels by the year 2050, with an incremental target of at least a 40% reduction in climate pollution by the year 2030. The CLCPA also enacted Section 75-0107 of the Environmental Conservation Law, which requires establishment of greenhouse gas emission limits of 60% of 1990 emissions by 2030 and 15% of 1990 emissions by 2050. The CLCPA also enacted

[17] *See* Case 18-E-0071, *In the Matter of Offshore Wind Energy*, Revised Generic Environmental Impact Statement (Issued June 14, 2018).
[18] Case 18-E-0071, *supra*, Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement (Issued July 12, 2018) (Order Establishing OSW).

Section 66-p of the Public Service Law, which required the Commission to establish a renewable energy program that set targets to require 100% emission-free electricity by 2040 and 70% of the State's electricity must be generated by renewable energy resources in 2030. To help the State achieve these targets, the CLCPA also requires the development of 9,000 MW of offshore wind energy by 2035. The Project is necessary for the State to achieve its energy and environmental goals, which are now enshrined in the CLCPA.

B. The Project's Environmental Impact

21. The Evidentiary Record describes the nature of the Project's probable environmental impacts with respect to land uses, visual resources, cultural resources, commercial and New York State marine commercial fishing license holders (NYSDEC-Licensed Fishermen), terrestrial and aquatic wildlife, wetlands and water resources, topography and soils, noise, transportation, communications, and electric and magnetic fields, which are briefly summarized below.

22. The Signatory Parties agree that the Project, as described in this Joint Proposal and the accompanying Appendices, including the proposed Certificate Conditions, will be designed, constructed, and operated in a manner that avoids or minimizes to the extent practicable any significant adverse impacts to environmental resources, considering the state of available technology and the nature and economics of the various alternatives and pertinent considerations.

23. Categorized by the type of impact, the following sections address the potential for environmental impacts as a result of the Project's construction, operation, and maintenance.

i. Land Use

24. The existing land uses along the Project Corridor consist predominately of vacant underwater land in NYS territorial waters, transportation, low to medium density residential land,

commercial and industrial land, and vacant land. To a lesser extent, the Project Corridor also includes high density residential, institutional, utilities, surface waters land use, and County parkland in Smith Point County Park and Southaven County Park.

25. The Applicant will commence Project construction only after enactment of S.8750-A, which authorizes the County of Suffolk to alienate certain lands used as parklands to enable Sunrise Wind LLC to construct, maintain, and operate a subterranean conduit and electrical distribution cable system in accordance with proposed Certificate Condition 17.

26. A portion of the Project will be located on certain parcels within the Central Pine Barrens region, including both the Compatible Growth Area (CGA) (Environmental Conservation Law (ECL) 57-0107 [12]) and the Core Preservation Area (CPA) (ECL 57-0107 [11]), which are under the Central Pine Barrens Joint Planning and Policy Commission's jurisdiction.

27. Approximately 2.4 miles of the Project is in the CGA. The CGA segment of the Project conforms with the Central Pine Barrens Comprehensive Land Use Plan (CLUP), as per ECL 57-0123 (3) (a).

28. Approximately 0.6 miles of the Project is in the CPA. The Applicant submitted a request to the Central Pine Barrens Joint Planning and Policy Commission for a CPA Compelling Public Need Hardship, which was approved on April 20, 2022, subject to certain listed conditions.

29. A copy of the Central Pine Barrens Joint Planning and Policy Commission's "Adopted Decision Sunrise Wind LLC Core Preservation Area Compelling Public Need Hardship" was filed with the Commission on May 4, 2022 (Evidentiary Record Exhibit 23).

30. Impacts on land use from Project-related activities—during construction and operation—are expected to be temporary and minimal and will not conflict with NYS land use

plans, regional and county land use plans, and local land use plans as outlined in further detail in Revised Exhibit 4 of the Application (Evidentiary Record Exhibit 5).

31. Where the SRWEC-NYS is joined with the Onshore Transmission Cable at the TJB located at the landfall location within the Landfall Work Area, the land use is primarily recreational within Smith Point County Park, specifically a paved parking lot and adjacent areas providing access to park amenities. From the TJB, the Onshore Transmission Cable runs parallel to Fire Island Beach Road within the paved Smith Point County Park parking lot, crossing the William Floyd Parkway to a recreational area. From there the Onshore Transmission Cable will be routed across the intracoastal waterway (ICW) via a horizontal directional drill (ICW HDD). While the land use varies along the remaining route of the Onshore Transmission Cable, it is primarily medium density residential along existing public road ROWs with additional commercial, recreational, and open space land use areas. The Onshore Transmission Cable will terminate at the OnCS–DC, located adjacent to the existing Northville Industries tank farm, National Grid's liquid natural gas (LNG) facility, and to the south by a Long Island Railroad (LIRR) ROW and is located in the Town's L1 zoning district. The OnCS–DC is also near (separated by Union Avenue) New York Power Authority's Richard M. Flynn Power Plant. The Onshore Interconnection Cable from the OnCS–DC will be routed along Union Avenue to an existing utility-owned or controlled property for connection to LIPA's existing Holbrook Substation located on existing utility-owned land north of the Long Island Expressway (LIE [I-495]) and portions of the Holbrook Substation parcel are located within three distinct Town Zoning Districts, including the L1, B Residence, and C Residence zoning districts.

32. The Project's construction will result in short-term, minor, and localized impacts to land use. The SRWEC-NYS, Onshore Transmission Cable, and Onshore Interconnection Cable

will be constructed entirely underground. Any areas temporarily disturbed during construction within the onshore Project Corridor will be restored to pre-construction conditions unless the Environmental Management & Construction Plan (EM&CP), which may be approved in phases (Certificate Condition 6 and Joint Proposal **Appendix G**), specifies otherwise. Final restoration of the Project site following construction will be in accordance with the Certificate Conditions (*see* Certificate Condition 71) and the approved EM&CP. The Applicant will perform construction activities in accordance with the Certificate Conditions, local zoning requirements, and/or as discussed in Exhibit 7 of the Application (Evidentiary Record Exhibit 8). Therefore, the Project will not conflict with current land uses or future planned land uses within, adjacent, or proximate to the Project Corridor.

33. Construction activities are not expected to result in changes to the base flood elevation as the Onshore Transmission Cable will be installed via HDD or installed below the existing grade via trenching within Project areas that are located within the 100-year floodplain.

34. Because the William Floyd Bridge is planned to be removed and replaced, construction of the Project near the existing William Floyd Bridge has been and will continue to be closely coordinated with NYSDOT and the Suffolk County Department of Public Works (DPW), and that consultation will be described in the Applicant's post-Phase 1 EM&CP (*see* Certificate Condition 43 [f]).

35. The Project has minimized impacts to parks and recreational resources as the Onshore Transmission Cable and Onshore Interconnection Cable will be installed entirely underground, the OnCS–DC will be adjacent to existing utilities' facilities and the LIRR ROW, and the Holbrook Substation is located on existing utility-owned land. In addition, as described below, pipe stringing will not hinder access to the nearby campground, park, or beach; and the

Smith County Park parking lot and fishing pier will have public access during construction of the Project. In addition, the SRWEC–NYS will land onshore utilizing HDD and will only require temporary use of the Landfall Work Area within Smith Point County Park on Fire Island. The proposed Certificate Conditions limit construction and schedule maintenance at the Landfall Work Area to begin the day after Labor Day and end the day before Memorial Day to accommodate recreational uses (*see* Certificate Condition 72). Moreover, the proposed Certificate Conditions require that the EM&CP include a Maintenance and Protection of Traffic Plan and a plan for access to the Project in parkland and open space areas such that the Project will not hinder the use of recreational uses or reduce existing parking areas below what is needed to accommodate seasonal use (*see* Certificate Condition 43 [h]). Accordingly, it is anticipated that the duration of the disturbance will be limited to the construction period and there will be no permanent impact upon parks or recreational resources.

36. The Project will be consistent with the *2016 New York State Open Space Conservation Plan* (Conservation Plan) as the SRWEC-NYS will be located underwater and the Onshore Transmission Cable will be located underground, primarily in existing roadway and utility ROWs. The Project will not preclude acquisition of additional open space as identified in the Conservation Plan or the designation of new natural, cultural, and recreational resources.

37. Moreover, the Project is also consistent with local land use plans and policies in the County and the Town. These local plans were considered when determining the Project's route and location to promote compatibility with existing and future land use (Evidentiary Record Exhibit 5).

ii. Visual Resources

38. As discussed and demonstrated in Exhibit 4 and Appendix 4-B to the Application, and the Holbrook Supplement (Evidentiary Record Exhibits 1, 5, and 22), the Project's long-term visual impacts are anticipated to be minor as the only Project components that will be visible after construction and during the Project's operational phase are the OnCS–DC and the expansion work at the Holbrook Substation.

39. As it relates to the OnCS–DC and Holbrook Substation expansion, the Applicant conducted viewshed analyses to evaluate the Project's impact on visual and aesthetic resources. In general, the Project will not substantially alter the Project Corridor's overall aesthetic character and visual quality. In addition, the proposed Certificate Conditions require the Applicant to conduct an assessment upon the Project's completion to determine, in consultation with the Town and landowners where applicable, whether additional landscape improvements at the OnCS–DC are required (*see* Certificate Condition 109).

40. The results of the visual analyses, submitted with the Application (Exhibit 4 and Appendix 4-E, which are also included in the Evidentiary Record as Exhibits 1 and 5) and the Holbrook Supplement (Evidentiary Record as Exhibit 22), indicate that due to the presence of mature vegetation surrounding the established residential neighborhoods within the visual study area and densely situated buildings and houses, the potential visibility of the OnCS–DC and Holbrook Substation would be generally limited to a few areas within approximately one-quarter mile.

41. Visual impacts during construction are anticipated to be minor, temporary, and short-term due to the presence of construction equipment and vehicles. The effects to visual resources will be limited to the window in which the construction activities are occurring and will be visible in the vicinity of the viewshed. Best Management Practices (BMPs), as described in the

appropriate phases of the EM&CP, will be implemented to maintain the Project Corridor free of debris, trash, and waste during construction (*see* Appendix E).

iii. Cultural and Historic Resources

42. As explained in Exhibit 4 of the Application (Evidentiary Record, Exhibit 5), the Applicant prepared an Onshore Above-Ground Historic Properties Report, which is included as Appendix 4-C to the Application and the Holbrook Supplement (Evidentiary Record Exhibits 1 and 22). Construction of the OnCS–DC will not require the demolition or physical alteration of any historic buildings or other above-ground historic properties. A potential indirect effect of the Project on a historic property will be a change in that property's visual setting results from the introduction of new structures at the OnCS–DC site. However, the proposed OnCS–DC will not be out of scale or character with the existing types of development currently present in the vicinity. Therefore, it is anticipated that the OnCS–DC will result in negligible visual impacts to the previously identified above-ground historic properties present in the OnCS–DC Preliminary Area of Potential Effects (PAPE). The OnCS–DC and the Holbrook Substation Expansion are the only above-ground facilities that will be built as part of the Project and is, therefore, the only part of the Project with potential to cause visual impacts to historic resources.

43. The Applicant prepared a Phase 1A Archaeological Survey for the Onshore Transmission Cable route. No previously identified cultural resources are located in the PAPE, but four previously recorded archaeological sites within Native American components are located within 0.25 miles. In addition, 5 previously recorded archaeological sites within historic-period components are located within 0.25 miles.

44. The Applicant prepared a Phase 1A Archaeological Survey Addendum, attached as Appendix 4-D1 to the Application (Evidentiary Record Exhibit 1), for the Onshore Interconnection

Cable, which provides that there are no previously recorded archaeological sites located within 0.25 miles of the Onshore Interconnection Cable route.

45. In addition, the Applicant prepared a Phase 1B Archaeological Survey, attached as Appendix 4-D2 to the Application (Evidentiary Record Exhibit 1), for the Project's onshore facilities, which consist of the Onshore Transmission Cable, OnCS–DC, the Onshore Interconnection Cable, and Holbrook Substation Expansion. As part of the Phase 1B Archaeological Survey, one archaeological site was identified within the location route that is no longer being considered (an Off-Route Variation), outside of the PAPE, but this site will not be disturbed by the onshore facilities as it is located along an Off-Route Variation. As such, the Phase 1B Archaeological Survey did not propose any mitigation or avoidance measures. The Phase IB Archaeological Survey explained that field investigations of some archaeologically sensitive areas are not feasible at this time because temporary laydown yards are not fully identified. Once those temporary laydown yards are identified, they will be subjected to a Phase IB survey and will be provided as an addendum to the Phase 1B Archaeological Survey, and consultations with the State Historic Preservation Office (SHPO) will be initiated.

46. The Project's operation and construction will not result in any direct impacts, including demolition or alternation, to any State/National Register of Historic Places listed sites.

47. As detailed in Exhibit 4 to the Application (Evidentiary Record Exhibit 5), the Applicant conducted an assessment of the existing conditions related to marine archaeological resources (MARs) to evaluate the potential for direct effects caused by the SRWEC-NYS construction and installation. Databases consulted during the evaluation of MARs revealed three shipwrecks and/or obstructions within one mile of the SRWEC-NYS centerline, but not within the SRWEC-NYS portion of the Project Corridor. To avoid impacts to MARs to the maximum extent

practicable, Applicant will adhere to the proposed Certificate Conditions and all other protective measures identified in the EM&CP. In addition, Applicant will follow the proposed Certificate Conditions in the event there is an unanticipated archaeological discovery during offshore construction (*see* Certificate Condition 169).

48. The Project has been designed to minimize impacts to cultural resources. The EM&CP will identify mitigation measures with respect to cultural and historic resource impacts, including steps to be taken if archaeological materials are encountered during Project construction. To avoid impacts to cultural and historic resources to the maximum extent practicable, Applicant will adhere to the conditions in the proposed Certificate Conditions (*see e.g.* Certificate Conditions 168, 169, 170, and 171) and all other protective measures identified in the EM&CP.

iv. Terrestrial Ecology and Wildlife

1. Vegetation and Wildlife

49. Construction related impacts to terrestrial vegetation are anticipated to be minor and short term. Impacts to terrestrial vegetation and wildlife within the Landfall Work Area, ICW HDD, and Carmans River have been avoided to the extent practicable due to the utilization of HDD technology and will otherwise be minimized and mitigated (*see e.g.* Certificate Condition 75; *see also* Certificate Condition 176). This construction method will eliminate the need for surficial ground disturbance and vegetative clearing within shoreline communities that would otherwise occur with traditional cable burial methods. The construction workspace will be kept to a minimum width necessary to accommodate space for safe equipment passage, material staging, and other work activities. Impacts to vegetation along the Onshore Transmission Cable route have been avoided to the extent practicable because it is primarily within existing roadway ROWs and

paved surfaces; where unavoidable, vegetation removal will be minimized. Tree-clearing that is required will be minimized to the extent practicable, and any impacts to Northern Long-eared Bats (NLEB) will be avoided in accordance with the NLEB conditions set forth in proposed Certificate Conditions 75 (b) (i) through 75 (b) (v). If it is determined to be necessary to take occupied habitat or individuals of NLEB, a Net Conservation Benefit Plan will be developed in consultation with and accepted by NYSDEC and DPS Staff as required in Certificate Condition 75 (b) (vi).

50. Following construction, operational vegetation management techniques within the Project Corridor will be consistent with the Vegetation Management Plan to be included with the EM&CP. Further, the Project's ROW will be maintained in accordance with the vegetation management conditions set forth in proposed Certificate Condition 200.

51. The amount of ROW clearing for the Project represents the required clearing necessary to prevent interference of vegetation with the proposed facilities, in accordance with good utility practice, and includes a commitment to replant or reseed any existing vegetated areas of parkland and beach/dunes that are disturbed during construction (*see also* Certificate Conditions 201, 205, and 208).

2. Invasive Species

52. To minimize the spread of invasive species as a result of Project construction, operation, and maintenance, the proposed Certificate Conditions prohibit the use of hay (*see* Certificate Condition 177), and the Applicant will prepare an Invasive Species Management Plan pursuant to the NYSDEC Invasive Species Management Plan Specifications as set forth in **Appendix P**, which will be made part of the approved EM&CP.

v. Wetlands and Waterbodies

53. As detailed in Revised Exhibit 4 to the Application, the ICW HDD will cross under several mapped NYSDEC-designated tidal wetland categories in the Great South Bay-East Significant Coastal Fish and Wildlife Habitat (SCFWH), including Littoral Zone (LZ) and Coastal Shoals, Bars, and Mudflats (SM), before reaching the ICW HDD Work Area at Smith Point Marina. These tidal wetlands are also mapped by the National Wetlands Inventory (NWI) as estuarine wetlands.

54. The Onshore Transmission Cable will traverse mapped NYSDEC-regulated freshwater wetlands at two locations which border the Carmans River. As these crossings, wetlands are also mapped by the NWI as forested and freshwater pond at Carmans River, and both are designated as Class 1 wetlands by NYSDEC. One NWI-mapped seasonally flooded, palustrine emergent persistent (PEM1A) is located parallel to I-495, approximately 150 feet south of the Onshore Interconnection Cable, but this wetland is not mapped as a NYSDEC-regulated wetland.

55. There are no mapped NYSDEC-regulated freshwater wetlands or NWI wetlands along the other areas of the Project's onshore components.

56. There is one tidal waterbody, the Great South Bay/ICW, that will be intersected by the ICW HDD as it transits between the ICW Work Area on Fire Island and the ICW Work Area on the mainland.

57. Due to restrictions on weight that can be transported across the County-owned William Floyd Bridge to the Landfall Work Area, the Applicant will install in the ICW and utilize temporary equipment during the Project's construction to facilitate the movement of construction equipment and materials to the Landfall Area (the Equipment). Before concluding the Equipment was necessary, the Applicant considered several alternatives, including a single HDD, an offshore HDD, open cut sea to shore transition, dismantling equipment, and helicopter transport, amongst

other options. None of those alternatives were viable or supported by necessary reviewing agencies (*e.g.*, USACE). As a result, the Applicant considered several factors when selecting the location of the Equipment, which is shown in Appendix B, including: site bathymetry, site topography, required amount of shoreline improvement, impact to submerged aquatic vegetation (SAV), wetlands, and species, proximity to Landfall HDD site, potential impact to vehicle and pedestrian traffic, and avoidance of the William Floyd Bridge construction zone. Research and surveys indicated that the selected location does not have SAV/eelgrass beds, despite being suitable habitat and further minimized impacts to wetlands, species, and vehicle/pedestrian traffic when compared to other potential locations. The Equipment will include, potentially, but not limited to: floating pier sections, floating pier spuds, piles, a transit barge, a crane barge, temporary bridge sections, ramping and an earthen transition pad to meet the parking lot at Smith County Park. The Equipment will be removed following construction and the site will be restored to its pre-construction condition.

58. Because the Equipment will be located in the Moriches Bay SCFWH, the EM&CP will provide a detailed assessment of how the Equipment avoids or minimizes impacts to the environment to the maximum extent practicable considering alternative methodologies. More specifically, the EM&CP will describe how the Equipment first avoids, and if avoidance is not possible, minimizes: (i) impacts to the seafloor, (ii) shading, and (iii) impacts to SAV. This assessment will include details regarding how the floating pier component of at least one of the considered options for the Equipment could be designed and constructed to avoid repetitive touching of or resting on the seafloor. The Applicant will similarly order Equipment to be the minimum size necessary to safely accommodate construction of the Project (*see* Certificate Condition 81). This assessment was agreed upon, in addition to other time of year restrictions

discussed below, in an effort to minimize impacts of the Equipment on protected species, SAV, and overall viability of Moriches Bay benthic habitat.

59. If it is determined in consultation with NYSDEC and NYSDOS that extant/existing SAV will be taken during construction, including due to use of the Equipment, the Applicant will implement a SAV Restoration Plan that will outline restoration of 3:1 for direct take and 1:1 for indirect impact (*see* Certificate Condition 155).

60. Impacts to NYSDEC-designated tidal, NYSDEC-regulated freshwater, and NWI wetlands and three SCFWHs (Smith Point County Park, Great South Bay-East, Carmans River) will be minimized through the use of HDD technology. This construction method will eliminate the need for surficial ground disturbance within shoreline communities and adjacent areas that will otherwise occur with traditional cable burial methods. To further minimize impacts from the HDD operations, the Applicant will include an Inadvertent Returns Plan in the EM&CP (*see* Certificate Condition 93 [a]).

61. The Applicant shall perform all construction, operation, and maintenance along the Onshore Transmission Cable in a manner that first avoids and then minimizes, to the maximum extent practicable, adverse impacts to wetlands and waterbodies and appropriate adjacent areas. If wetlands and waterbodies cannot be fully avoided, as provided in proposed Certificate Condition 158, any such activities in wetlands and waterbodies shall be performed in accordance with a Wetland Impact Minimization and Mitigation Plan to be included in the EM&CP, which will be prepared pursuant to **Appendix S** of the Joint Proposal.

62. Except as otherwise permitted in the Certificate Conditions or EM&CP, no construction activities shall occur within any wetlands and waterbodies; historic, extant, or existing SAV beds; any Natural Protective Feature (*e.g.*, nearshore areas, beach, dune); and ponds or pools

associated with the Carmans River watershed, and no construction materials, equipment, or vehicles shall be allowed to enter upon such wetlands and waterbodies and appropriate adjacent areas (*see* Certificate Condition 154).

63. As it relates to other water resources, and as memorialized in the proposed Certificate Conditions, the Applicant will first avoid and then minimize to the maximum extent practicable impacts to the Coastal Erosion Hazard Area (CEHA) (*see* Certificate Condition 156).

64. Construction related impacts to ocean and littoral habitats are anticipated to be minor and short term. Installation of the SRWEC–NYS will result in localized and temporary impacts that will be minimized to the extent practicable using either simultaneous lay and burial or pre-lay and post-burial processes and will otherwise be minimized and mitigated (*see* Certificate Conditions 87, 89, and 142).

65. Impacts to nearshore zones and benthic resources from the SRWEC–NYS Landfall will be avoided to the extent practicable due to the utilization of HDD technology and will otherwise be minimized and mitigated (*see e.g.* Certificate Conditions 92 and 192). This construction method will eliminate the need for direct impacts to dunes, beach, nearshore zones and benthic resources that would otherwise occur with traditional cable burial methods.

66. As outlined in Certificate Condition 163, fueling of equipment—aside from hand equipment when secondary containment is used (*see* Certificate Condition 198 [a])—and storage of fuel or other chemicals is strictly prohibited within tidal wetlands and within 100 feet of the tidal wetland boundary. Fueling and storage areas within 300 feet of any tidal wetland and/or within the New York State Coastal Area as defined within NYS Executive Law § 911 (1) and (2) must be delineated in the appropriate phased EM&CP and contained by strawbales or other approved containment devices (i.e., containing at least 110% of the volume stored) to prevent spills

from entering tidal wetlands and/or waterways. Should a spill occur, the permittee shall immediately notify the Regional Marine Habitat Protection Office at 631-444-0295, the NYSDEC Spill Hotline at 800-457-7362, and shall provide a plan for containment, clean-up and restoration of the impacted area for the approval of the department.

67. No refueling is authorized on the beach (*see* Certificate Condition 163).

vi. Impacts on Protected Threatened and Endangered Species

68. The Applicant will take all necessary measures consistent with this Joint Proposal, the proposed Certificate Conditions, and the EM&CP, as well as specific measures described below to avoid or minimize impacts to threatened and endangered species.

69. To minimize the risk of an incidental take of Atlantic sturgeon, no in-water seabed disturbing work, including jet trenching trials, but not including installation and decommissioning of the Equipment, will occur May 1 to June 30 and September 1 to November 30 except for limited seabed disturbing work activities detailed in proposed Certificate Condition 75 (a). To further minimize the risk to Atlantic sturgeon, if the Applicant needs to perform backfilling of the HDD exit or remedial burial/secondary cable protection installation during the restricted windows, the Applicant must abide by an Atlantic Sturgeon Monitoring and Mitigation Plan that meets the substantiative requirements of 6 NYCRR Part 182, which will be included as part of the EM&CP.

70. As discussed above, the Applicant will comply with the requirements with respect to tree-clearing outlined in proposed Certificate Condition 75 (b) to protect the NLEB.

71. To alleviate concerns that noise and other temporary construction and maintenance activities may deter or otherwise impact federally and State-listed nesting shorebirds, no on-beach work (*i.e.*, between the back dune and Mean Low Water) shall occur between April 1 and August 31 in any year. As detailed in proposed Certificate Condition 75 (c), this time of year restriction

does not prohibit the Applicant from performing construction work at the Landfall Work Area or the ICW Work Area. However, Certificate Condition 75 (e) provides additional protections for active nests, nest trees, and roosts, which shall not be approached under any circumstances unless authorized by DPS Staff and NYSDEC. This is in addition to several other notification requirements and Environmental Monitor reviews in the event any T&E species, as defined in 6 NYCRR Part 182 or plant species identified under 6 NYCRR Part 193 are encountered on the onshore portion of the Project Corridor (*see id.*).

72. To minimize the risk of an incidental take of Winter flounder, no in-water seabed disturbing work activities, aside from the specific activities outlined in proposed Certificate Condition 75 (d), will occur in the ICW between December 15 and May 31 in any year. The Applicant will submit a Winter Flounder Monitoring and Minimization Plan to the NYSDEC if installation or decommissioning of the Equipment occurs between December 15 and May 31. If, in consultation with NYSDEC, it is determined that the Equipment will result in a take of Winter Flounder, the Applicant will submit a Winter Flounder Net Conservation Benefit Plan (NCBP) that meets the substantive requirements of 6 NYCRR Part 182.

73. To minimize the potential for in-water work to impact threatened and endangered marine species, the proposed Certificate Conditions require the Applicant to comply with BOEM and National Oceanic and Atmospheric Administration (NOAA) requirements for mitigation, monitoring, and reporting for protected species as detailed in the federal COP approval (Certificate Condition 179). Further, any sightings of North Atlantic Right whales must be reported to NOAA within 24 hours (Certificate Condition 180).

74. Additionally, if any work results in or is likely to result in an incidental take of an endangered or threatened species as defined in 6 NYCRR Part 182, the Applicant must stop work

where the take occurred or is likely to occur and submit an Endangered or Threatened Species Mitigation Plan and Implementation Agreement demonstrating proposed mitigation measures that will result in a Net Conservation Benefit to that species (Certificate Condition 174).

75. The appropriate phase EM&CP(s) will list the activities and anticipated timeframes proposed within SCFWH and identify avoidance and minimization measures for: (1) significant concentrations of waterfowl during spring or fall migration and overwintering associated with the following SCFWHs: Great South Bay-East, Moriches Bay; and (2) overwintering and active nesting sites for raptors (*e.g.*, peregrine falcon, northern harrier, osprey, Cooper's hawk) and nesting shorebirds associated with the following SCFWHs: Carmans River, Great South Bay-East, Moriches Bay, and Smith Point County Park (*see* Certificate Condition 157).

vii. Water Quality

76. No permanent or long-term impacts on water quality from cable installation, operation, repair, maintenance, or decommissioning are expected. Such activities will be performed in accordance with the proposed Certificate Conditions to avoid or minimize water quality impacts. Decommissioning will be covered by appropriate letters of credit and the primary decommissioning plan is outlined in **Appendix R** to this Joint Proposal.

77. To preserve water quality during construction and operation of the Project, proposed Certificate Condition 181 mandates that the water quality standards set forth in 6 NYCRR Parts 701, 702, 703 and 704, and sections 301, 302, 303, 306, and 307 of the federal Clean Water Act (*see* 33 USC Parts 1311, 1312, 1313, 1313a, and 1317) will not be contravened. Further, the Applicant will comply with any conditions contained in a Water Quality Certification issued pursuant to pursuant to Section 401 of the Federal Clean Water Act.

78. In addition, the proposed Certificate Conditions set forth total suspended solids (TSS) limits to which the Applicant must adhere and procedures to follow if TSS concentrations exceed those established limits. The Applicant must include its plan for monitoring water quality with respect to sediment disturbing activities in a Suspended Sediment and Water Quality Monitoring Plan as part of the EM&CP. The Suspended Sediment and Water Quality Monitoring Plan must be consistent with **Appendix I** of the Joint Proposal, Suspended Sediment and Water Quality Plan Scope of Study and Certificate Conditions 182 and 183.

79. To minimize impacts on water quality, the offshore conduit end of the SRWEC–NYS may only be exposed or buried by means of hydraulic or mechanical dredging (*see* Certificate Condition 190). As described more in Paragraph 130 below, material needed for cover of the Landfall HDD conduit end will be placed adjacent to the Landfall HDD conduit location for later use as cover material. Material placement will be done to minimize the footprint of the reverse backfill material and the Certificate Holder will minimize the sediment removed from the offshore HDD exit to the maximum extent practicable (*id.*).

80. If material to be dredged is contaminated, prior to dredging, the Certificate Holder shall identify the final dredged material disposal location, including a letter from the permitted disposal facility verifying that they will accept the material (*see* Certificate Condition 190). Certificate Condition 190 further outlines how contaminated material, if any is encountered, shall be handled to minimize impacts on water quality.

81. Certificate Condition 192 outlines the methodologies that shall be applied to minimize sediment released into the water column during the Landfall HDD conduit installation, including the requirement that the environmental monitor shall inspect all installation equipment

to be utilized at the offshore HDD exit prior to use and shall perform periodic inspections of all such equipment no less than once per week when in use.

82. A Spill Prevention, Control, and Countermeasures (SPCC) Plan will be filed as part of the EM&CP and implemented to minimize the potential for unintended releases of petroleum and other hazardous chemicals during Project construction and operation.

viii. Topography and Soils

83. As described in Exhibit 4 of the Application (Evidentiary Record Exhibit 5), no adverse impacts related to topography, geology, soils, or groundwater are anticipated. The Onshore Transmission Cable and Onshore Interconnection Cable will involve trenchless construction methods, as well as conventional trenching and excavation. In areas where grading and the excavation of previously disturbed soils are required for the installation of the Onshore Transmission Cable, surface grades will be stabilized and returned to pre-construction conditions where practicable in coordination with the County and Town Department of Public Works. Temporary erosion control measures (*i.e.*, temporary straw bale/silt fence barrier) will be utilized, as outlined in the EM&CP and the Stormwater Pollution Prevention Plan (SWPPP), Municipal Separate Storm Sewer (MS4) approval(s), five-acre waiver (if necessary), and NYSDEC's letter of acknowledgement of the Notice of Intent for coverage under the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (the SPDES General Permit).

84. The construction of the OnCS–DC and Holbrook Substation Expansion will include general site preparation and grading, which will ensure adequate drainage and grading to reduce impacts from water accumulation. Temporary environmental erosion controls such as swales and erosional control socks will be installed in accordance with BMPs as outlined in the SWPPP.

85. Prior to the start of construction activities, temporary erosion control measures, outlined in the EM&CP and SWPPP will be utilized to reduce the risk of soil erosion, fugitive dust from exposed soils, and siltation. If contamination in the ground is detected during the Project's construction, and such contamination is of the kind that will lead to volatilization or off-gassing of such contamination or chemical constituents thereof, the Applicant shall contact New York State Department of Health (NYSDOH), NYSDEC, and DPS Staff prior to further disturbance.

86. Dewatering will likely be required in some areas to control surface and subsurface water to allow the Applicant to perform necessary construction activities. A Dewatering Plan will be included in the EM&CP (Certificate Condition 53). Any dewatering that is required in excavated and/or trenched areas will be properly managed by appropriate control measures, and the Applicant will ensure that the appropriate dewatering measures will be implemented during construction consistent with the Certificate Conditions (*see* Certificate Conditions 51, 52, and 53).

87. Where the Applicant must site the Onshore Transmission Cable within 100 feet of a known existing, active drinking supply well, the proposed Certificate Conditions require the Applicant to perform pre- and post-construction turbidity testing on the well water, provided the Applicant is granted access by the property owner (*see* Certificate Condition 26).

ix. Transportation Impacts

88. The anticipated effects of Project construction and operation on airports, railroads, roadways, and pedestrian ways are described below. In short, the Project will have no discernible permanent impacts on these transportation systems.

1. **Airports and Heliports**

89. There are three airports and one heliport within the vicinity of the Project Corridor.

90. The maximum height of the lightning masts on the OnCS–DC and at the Holbrook Substation is 85 feet. Therefore, vertical construction associated with the OnCS–DC and Holbrook Substation will not interfere with air traffic or communications, per Federal Aviation Administration (FAA) industry standards regarding electrical interference. The Applicant will work with the FAA to determine if the proposed transmission structures and construction activities will impact air navigation. If the FAA requires, the final design and construction of the new structures will incorporate appropriate mitigation measures and will be included in the EM&CP, which will also include FAA Determinations resulting from the Notice of Proposed Construction or Alteration process (if applicable).

2. **Roads**

91. The Onshore Transmission Cable will be primarily located within existing public road ROW and, as detailed in Exhibit E-6 to the Application (Evidentiary Record Exhibit 16), crosses several roadways in the Town. In addition, two public parking lots will be utilized for construction of the Onshore Transmission Cable—specifically the Smith Point County Park parking lot and the paved parking lot within the Smith Point Marina. To minimize impacts to local traffic, several trenchless crossings are planned along the Onshore Transmission Cable and Onshore Interconnection Cable. Additionally, the Onshore Transmission Cable route was selected to avoid several of the most congested intersections and road segments in the Town. Nevertheless, the Onshore Transmission Cable will require one crossing of a major roadway—Sunrise Highway. Additionally, pipe stringing will occur on Burma Road and will be performed in accordance with proposed Certificate Condition 82. The use of Burma Road for pipe stringing will minimize recreational impacts associated with this activity because it will not hinder access to the nearby campground, park, or beach access, and minimizes beach impacts.

92. The EM&CP will demonstrate that access to the Project Corridor will not hinder use of recreational areas nor reduce existing parking areas below what is needed to accommodate seasonal use (*see* Certificate Condition 43 [h]). Moreover, after Labor Day, Applicant's construction efforts will not prevent the public from accessing the parking lot on Smith County Park. Similarly, the Applicant's construction efforts will not prevent the public from accessing the fishing pier on Smith County Park unless temporarily necessary for safety purposes (e.g., movement of equipment near access point to the fishing pier). Any such temporary closures shall be limited to the maximum extent practicable (*see* Certificate Condition 73).

93. A Maintenance and Protection of Traffic (MPT) Plan will be prepared for all roadways directly affected by construction activities in accordance with the proposed Certificate Conditions. Project construction will result in short-term, temporary, and minor impacts to the roadways presented in Exhibit E-6 to the Application (Evidentiary Record Exhibit 16).

94. A Highway Work Permit (HWP) and a Use & Occupancy Permit (U & O) from the NYSDOT are required per 17 NYCRR Parts 126, 127, and 131 to install utilities within or adjacent to New York State highway ROWs. Following final design and preparation of the Phase 1 EM&CP, the Applicant will apply for and obtain HWP(s) and U & O(s) from the NYSDOT for work in all applicable roads. The Applicant will fully comply with all permit conditions defined in the HWP(s) as well as other applicable NYSDOT requirements, including the need to obtain any Federal Highway Administration approval prior to the commencement of construction (*see* Certificate Condition 17) longitudinally within the controlled access line of the South Service Road of the LIE [I-495] and an underground crossing of the LIE [I-495] and Sunrise Highway.

95. The Applicant will restore all construction-related impacts to pavement, curbs, and sidewalks to their pre-construction condition or improved, or as otherwise addressed in an applicable agreement with the relevant local government (*see* Certificate Condition 107).

3. **Railroads**

96. The Onshore Transmission Cable will cross the LIRR at two locations: (i) along the LIRR Montauk Branch at Church Road, and (ii) along the LIRR Ronkonkoma Branch near Manor Road. The OnCS–DC will be located north of the LIRR Ronkonkoma Branch. The installation of the Onshore Transmission Cable at the two LIRR crossing will be done via trenchless crossing techniques and detailed in the EM&CP. Entry and exit pits for the trenchless crossing of the LIRR will be secured with barricades, and the active work areas will be fenced off. At the LIRR, flashing lights may be installed. The Applicant will coordinate with the LIRR to avoid interference with railroad signaling and communications. Because the Onshore Transmission Cable crossing will be entirely underground, it is not anticipated that operation will have an impact on train service.

4. **Public Bus Routes**

97. There are six Suffolk County Transit public bus routes in the Town that are crossed at various points by the Onshore Transmission Cable. Construction of the Onshore Transmission Cable will occur along existing transportation corridors, requiring temporary isolated and/or partial road closures that may result in potential traffic delays, congestion, and narrow roadways. These impacts will be localized and temporary. The Applicant intends to maintain at least one travel lane of traffic in the section(s) of NYSDOT roads in which construction crews are working (Certificate Condition 110). Thus, construction activities may result in temporary lane closures along Suffolk County Transit's bus routes. Traffic control measures will be developed as part of the MPT Plan

within the EM&CP. The MPT Plan will also reflect the outcomes of consultations with traversed school districts, including any measures taken with respect to school bus routes (Certificate Condition 43 [d]).

5. **Marine Navigation**

98. The SRWEC-NYS and Onshore Transmission Cable run through nearshore waters along the coast in an area of Long Island that is used for both commercial and recreational marine vessel traffic.

99. The Onshore Transmission Cable will cross via the ICW HDD to minimize and avoid impacts to the ICW, and all Project construction activities will be closely coordinated with local, NYS, and federal agencies, including the United States Army Corps of Engineer (USACE) and the United States Coast Guard (USCG), and will comply with the permit and approval conditions issued to the Project by these federal agencies, as applicable (Certificate Condition 95). There are no Aids to Navigation (ATON) present within the SRWEC-NYS or Onshore Transmission Cable corridors. Applicant also removed its request that the Commission waive compliance with the local law restricting improper mooring.

100. The proposed Project design, construction schedule, and construction techniques will minimize impacts to navigable waterways from construction of the SRWEC-NYS. This includes, but is not limited to, the requirement that in-water activities be undertaken and the SRWEC-NYS will be maintained in a manner that minimizes the potential for interference with navigation, and other water-dependent uses of the area, including but not limited to fishing, boating, and recreation (*see* Certificate Condition 90). Including, for example, burial depth, which will be a minimum of six feet to reduce the risk of interactions with commercial vessels (*see* Certificate Condition 80; *see also* Paragraph 137, *infra*). In addition, in the unlikely event of an

anchor strike, the Applicant will provide notice to the Secretary identifying details of the incident and near-term actions to address impacts to the cable (*see* Certificate Condition 84; *see also* Paragraph 139, *infra*).).

101. See discussion below on fisheries (Point IV [b] [xiii]) for a summary of the extensive mariner communication and coordination commitments that the Applicant has made to minimize impacts to marine navigation and fisheries, including the notifications outlined in Appendix J.

6. **Pedestrian Traffic**

102. The SRWEC-NYS and Onshore Transmission Cable will cross areas of the Town that are used for recreational purposes, including public access to the waterfront, public bike lanes, historic trails, and corresponding public parking lots. The Onshore Transmission Cable will be installed underground in existing ROWs and parking lots to minimize impacts to pedestrian traffic, but construction activities may temporarily impact pedestrian traffic. The work areas for the landfall HDD and the ICW HDD will require temporary and minor use of public parking lots and recreational areas at Suffolk County Parks. The Applicant will implement appropriate construction safety practices, such as temporary barricades and fencing, to prevent pedestrians from entering construction work zones. Proposed signage and other mitigation measures to protect pedestrian traffic conflicts during construction will be detailed in the EM&CP.

x. Communication Impacts

103. The Applicant's review of Federal Communication Commission (FCC) databases indicates that 47 registered commercial telecommunications towers are located within 1 mile of the Project. These towers include antenna structures licensees and microwave towners licensees. There are no cellular telephone towers licensees, FM radio towers licensees, land to mobile

transmission tower licensee, paging tower licensee, or TV station transmitter licensees in the FCC databases within one mile of the Project.

104. The Project will cross the known submarine telecommunication cable, Apollo North, near the Landfall Work Area. Certificate Condition 27 lists specific requirements pertaining to proposed facility crossings, co-locations, construction within existing easement, and machinery crossings.

105. As more fully described in Exhibit E-5 of the Application (Evidentiary Record Exhibit 15), the Project is not expected to have adverse effects on communications (*i.e.*, television, radio, mobile phone, cable, fiber optic, railroad signaling etc.) during construction or operation. In the event that interference with communications is reported in the Project Area, the Applicant will take appropriate action to address such interference.

106. The Onshore Transmission Cable and Onshore Interconnection Cable will comply with applicable provisions of the National Electrical Safety Code (NESC) related to appropriate spacing between power and communication cables to minimize the impacts to underground communication cables (Certificate Condition 13).

xi. Noise Impacts

107. Construction noise associated with the Project will be temporary in nature and impact and will vary according to the construction equipment used and the existing background or ambient noise at given times and locations. Residents and businesses could be temporarily affected by noise from construction activities but will not be exposed to significant levels for an extended period. The Applicant will implement construction noise mitigation measures as detailed in the Construction Noise Control Plan, appended as **Appendix K** to the Joint Proposal, and the EM&CP, if necessary. In addition, to limit and track noise mitigation measures, the Applicant will be subject

to the Specifications for Computer Noise Modeling and Tonal Evaluation and the Sound Testing Compliance Protocol (STCP), appended as **Appendices L** and **M** to the Joint Proposal.

108. Construction activities shall be restricted to the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday, except for construction activity in connection with any HDD; cable pulling, and laying, cable joint splicing; OnCS–DC work; and other activities reasonably necessary to comply with NYSDOT specifications or other permit or contractual restrictions on daytime construction in or along roadways or public access areas (Certificate Condition 76).

109. The Applicant's Onshore Acoustic Assessment, submitted as Revised Appendix 4-I to the Application, examined potential noise impacts resulting from the Project's construction and operation and is further detailed in Exhibit 4 to the Application (*see also* (Evidentiary Record Exhibit 24).

110. Noise generated during the Project's operation will include sound sources associated with operation of the OnCS–DC. Noise from operation of the SRWEC-NYS, Onshore Transmission Cable, Onshore Interconnection Cable, and the Holbrook Substation expansion are not anticipated, except during routine maintenance that may require short-term use of equipment with noise emissions to facilitate inspections and repairs.

111. Noise generated during the operation of the OnCS–DC will comply with a variety of criteria as outlined in Certificate Conditions 47-50.

112. Final computer noise modeling and tonal evaluation shall be conducted in accordance with the Specifications for Computer Noise Modeling and Tonal Evaluation, attached as **Appendix L**.

113. The OnCS–DC Site shall be evaluated by the Applicant by following the provisions and procedures for post-construction noise performance evaluations included in the STCP,

Appendix M, after the commercial operation date of the OnCS–DC Site (Certificate Condition 49).

xii. Electric & Magnetic Fields

114. The Applicant's analysis of the expected electric and magnetic field (EMF) levels resulting from the Project was filed in Appendix 4-J to the Application filed in January 2022 (Evidentiary Record Exhibit 1), as updated by Record Exhibit 24. The Project involves transmission of electricity generated by the SRWF as DC through NYS waters on the SRWEC-NYS. Once onshore, transmission occurs via the Onshore Transmission Cable to the OnCS–DC where current is converted from DC to AC. From the OnCS–DC, the AC current is transmitted via the Onshore Interconnection Cable to the point of interconnection at the Holbrook Substation.

115. The Signatory Parties agree that the Project will be constructed and operated to comply with EMF guidelines and standards established by the Commission in Opinion No. 78-13, issued June 19, 1978, and the Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities, issued September 11, 1990 (Certificate Condition 21).

116. In addition, the Certificate Conditions commit the Applicant to conduct certain post-construction bathymetric measurements, analysis of as-built installation plan and profile drawings and maps to validate the EMF modeling results, and offshore magnetometer measurements to confirm compliance with the above standards (Certificate Conditions 22-24).

117. The Applicant will provide the results of these efforts to researchers conducting the agreed-upon Fisheries Monitoring Plan and Benthic Sampling Plan to allow that team—funded by the Applicant as part of commitments made in this Joint Proposal—to assess potential impacts associated with the operation of the SRWEC-NYS on the behaviors and migratory patterns of

commercially and ecologically important species in coast waters south of Long Island (Certificate Conditions 25, 140-142, and 146).

xiii. Fishing and Fisheries

118. Potential impacts to the fishing industry include temporary and limited displacement of fishermen and the potential for fishing gear losses during construction, operation, maintenance, and decommissioning activities. However, the SRWEC-NYS is not expected to have significant long-term impacts to benthic and shellfish resources during any of the Project's phases with the exception of the sidecasting associated with the HDD pit, which has the potential to cause greater impacts relative to the installation of the SREWC-NYS. As outlined above, all in-water work shall be undertaken in a manner that minimizes the potential for interference with navigation, and other water-dependent uses of the area, including but not limited to fishing, boating, and recreation (Certificate Condition 90).

119. The Applicant has committed to provide notice to NYSDEC-Licensed Fishermen, as well as DPS Staff, NYSDEC, NYSDOS, and NYSAGM with important information updates regarding in-water work as detailed in proposed Certificate Conditions and **Appendix J** to the Joint Proposal. For example, weekly status reports indicating construction activities and notice of commencement of any seabed preparation, HDD and HDD exit pit installation and backfill, and cable installation activities, as well as notice of recommencement if activities are suspected for more than 14 days. All notices distributed pursuant to Appendix J will identify and include as appropriate: (1) the general dates of work; (2) general types of work (e.g., survey, cable, HDD construction, etc.); (3) the general vicinity of the work, with a National Oceanic Atmospheric Administration (NOAA) work zone chart with coordinates or its closest equivalent; (4) the vessel(s) conducting the work (which are subject to change); and (5) contact information of an

employee or agent of the Applicant who will be knowledgeable about the noticed work and able to timely contact the appropriate person(s) conducting the work. In addition, the Applicant must request updated NYDEC-Licensed Fishermen mailing and e-mail address lists from the NYSDEC at least monthly beginning one month prior to filing a copy of the EM&CP.

120. The Applicant and Signatory Parties agreed on several proposed Certificate Conditions that will avoid or minimize, to the extent practicable, significant impacts to fishing operations. These protections include, but are not limited to, installing via a Landfall HDD (Certificate Condition 92); a minimum cable burial depth for the SRWEC-NYS (Certificate Condition 80), multiple installation passes if target burial depth is not achieved initially (*id*.); minimizing boulder relocation and notice requirements when relocation is necessary (*id*.); a requirement not to use cable protection unless it is necessary to protect the integrity of the cable (Certificate Condition 88); the implementation of a SRWEC-NYS Maintenance Plan, which includes a plan for promptly remedying cable exposures and details on how to address unacceptable risks to the cable to minimize potential impacts to commercial and recreational vessel traffic (Certificate Condition 137); assessment of whether the offshore HDD exit left a discernable depression and, if so, whether backfill is necessary (Certificate Condition 192 [d]). Further, no cofferdams or similar structures will be used to construct the Project.

121. In addition to the foregoing, the Applicant will submit a Fisheries Compensation Plan with the EM&CP, as outlined in proposed Certificate Condition 60, which provides for a claims process for commercial fisheries gear loss and compensation during all phases of the Project.

122. The Applicant and Signatory Parties engaged in extensive discussions regarding the protections of fisheries and incorporated the measures to avoid or minimize impacts of the

Project's construction, operation, and maintenance to the fishing industry to this Joint Proposal and proposed Certificate Conditions.

123. As detailed in proposed Certificate Conditions 143, 144, 145, and 147, the Applicant has prepared a Fisheries Monitoring Plan and Benthic Sampling Plan (*see* Appendices N and O of Joint Proposal) that will, in part, assess the potential impacts associated with the operation of the SRWEC-NYS on the behaviors and migratory patterns of commercially and ecologically important species in coastal waters south of Long Island.

xiv. Benthic Resources and Offshore Water Quality

124. Construction, installation, operation, and maintenance activities associated with the SRWEC-NYS have the potential to cause both direct and indirect impacts on benthic resources and shellfish. However, most activities associated with the SRWEC-NYS are not expected to have long-term impacts to benthic resources and shellfish during any of the Project's phases. Most impacts are largely expected to be minor, localized, and short-term in nature. During construction of the SRWEC-NYS seabed disturbance, noise, and sediment suspension will likely affect benthic resources and shellfish.

125. Seabed disturbance from most project activities is expected to produce minor, direct, or indirect impacts to species depending on the mobility of benthic and shellfish species. These minor impacts would result from pre-lay grapnel runs and installation of the SRWEC-NYS. Benthic species are expected to recolonize the impact area from these activities following construction. HDD exit pit excavation will likely have a greater effect on benthic resources and shellfish relative to the installation of the SREWC-NYS due to sidecasted sediment having a smothering effect on the benthos, likely leading to a longer recolonization period in this area.

126. The SRWEC-NYS will be sited to avoid impacts to sensitive habitats (*e.g.*, hard bottom habitats) (Certificate Condition 89).

127. Further, to minimize habitat disruption, installation of the SRWEC-NYS will be buried using equipment such as mechanical plow, jet plow, and HDD. In addition, although sand wave leveling was originally proposed in the Application for Project installation, the Applicant has committed to not conduct any sand wave leveling during site preparation or installation of the SRWEC-NYS. Similarly, many of the construction limitations and other requirements discussed above to reduce impact to commercial fisheries minimize habitat disruption, including monitoring any discernable depression at the HDD exit.

128. Effects associated with noise are expected to be minor and short-term with benthic resources returning to the area after the noise-generating activity has been completed. Vessel noise may cause temporary behavioral changes; however, this is not expected to be different than what currently occurs when vessels transit the area. In addition, any noise impacts due to HDD operations are anticipated to be minor, localized, and short-term in nature.

129. Impacts caused by sediment suspension and deposition during construction of the SRWEC-NYS will be mitigated and monitored through the implementation of a Suspended Sediment and Water Quality Monitoring Plan as part of the EM&CP as discussed *supra* in Paragraph 78 and through operational controls of the jet plow to minimize suspension of sediment during cable installation.

130. The proposed Certificate Conditions require the Applicant to complete benthic sampling in accordance with **Appendix N** appended to the Joint Proposal. The purpose of the Benthic Sampling Plan is to establish baseline benthic conditions prior to cable installation within NYS waters and subsequently monitor post-installation benthic conditions to access any effects

from installation activities and operation of the SRWEC-NYS, including thermal and EMF impacts (Certificate Condition 141).

131. As outlined in the following paragraph, the Project's design modifications to reduce Landfall HDD bores from three to one also reduced the potential impact the offshore HDD exit will have on benthic habitats and the marine community generally because the Project now has only a single offshore HDD exit. In addition to those reduced potential impacts and the associated improved water quality, and in light of the agreed-upon methodology for constructing the offshore HDD exit (Certificate Condition 190), the Applicant will perform a focused benthic study designed to investigate benthic recovery following completion of construction at the offshore HDD exit (Certificate Condition 191). The scope of that study is outlined in Joint Proposal, **Appendix Q**.

xv. SRWEC-NYS Construction and Maintenance

132. Since commencing this proceeding, the Applicant made several design changes to the SRWEC-NYS that allowed the Project to have a single bore—instead of three bores—at the Landfall HDD. These design changes significantly reduced the environmental impacts associated with the Project (*e.g.*, reduced benthic habitat impact and improved water quality), reduced the Project's overall Magnetic Field levels due to the elimination of separated bore paths, and reduced potential interference with commercial and recreational uses.

133. Installation of the SRWEC-NYS will not result in any effects on tide and current conditions in the vicinity of the Project because the SRWEC-NYS will be installed below the seabed. The SRWEC-NYS landfall will be installed utilizing HDD. This installation methodology will achieve a sufficient burial depth such that this portion of the SRWEC-NYS will not be impacted by coastal morphology.

134. To minimize impacts to residents, business, and threatened and endangered species, all drilling operations associated with the SRWEC-NYS will comply with the time of year restrictions proscribed in Section G of the proposed Certificate Conditions.

135. Prior to the commencement of construction of the SRWEC-NYS, the Applicant will engage in limited offshore site preparation in accordance with proposed Certificate Condition 79. This site preparation will include boulder removal and pre-lay grapnel run (*see id*.).

136. As mentioned above, no sand wave leveling will occur during site preparation or installation of the SRWEC-NYS.

137. Exclusive of the portion of the cable installed via HDD, the SRWEC-NYS will be installed a minimum of six feet below the existing seabed (Certificate Condition 80). The SRWEC-NYS, exclusive of the landfall HDD and offshore HDD exit, will be installed using either simultaneous lay and burial or pre-lay and post-burial processes (Certificate Condition 87).

138. The Applicant may use a casing pipe, or a similar Commission-approved containment structure (collectively referred to as Temporary Containment), or no containment structure, around the landfall HDD exit during construction. Final details regarding whether a Temporary Containment will be used, and, if so, the type, design, and installation method shall be included in the EM&CP (*see* Certificate Condition 91).

139. The Applicant shall include an Anchoring Plan in the EM&CP that will discuss how the use of anchoring, if any, will avoid and/or minimize impacts to sensitive benthic habitats (*e.g.*, use of vessels equipped with dynamic positioning systems, installing mid-line buoys), and outline the parameters for the use of anchors and spuds within the Project Corridor (Certificate Condition 83).

140. The proposed Certificate Conditions set forth TSS limits that must be observed (*see* Certificate Condition 187). To ensure adherence to those TSS limits, the Applicant is required to conduct jet trencher trials (Certificate Condition 188) to calibrate the cable installation tools to minimize turbidity, complete a Suspended Sediment and Water Quality Monitoring Plan, and stop work if activities exceed standards at the edge of the 1,500-foot mixing zone before restarting at modified levels (*see id*.). Further, visual observations of turbidity will be conducted to ensure compliance with the narrative water quality standard in 6 NYCRR § 703.2 (Certificate Condition 193).

141. Following consultation with DPS Staff, NYSDEC, and NYSDOS, the Applicant shall include a cable monitoring and management plan (SRWEC–NYS Maintenance Plan) (*see* Certificate Condition 137) as part of the post-Phase 1 EM&CP, which shall include a variety of information, including, but not limited to: (i) requirement that the Applicant establish depth of burial relative to seabed and the accurate level of the seabed relative to vertical datum during post-construction survey operations, (ii) details regarding post-construction survey substance and timing, (iii) a plan for remedying cable exposures, (iv) a detailed description of the Applicant's risk-based assessment that identifies how risks will be identified and evaluated and how unacceptable risks will be addressed, and (v) additional information regarding the Applicant's actions following the identification of an unacceptable risk to the SRWEC-NYS and a risk to the SRWEC-NYS (*see* Certificate Conditions 138 and 139).

xvi. Decommissioning

142. If cable maintenance or decommissioning is required, such activities will be performed in accordance with the proposed Certificate Conditions to avoid or minimize environmental impacts. Decommissioning will be covered by appropriate letters of credit, except

as described in Paragraph 143 below and Certificate Conditions 209 and 210 for the New York State Area under NYSDOT jurisdiction, and the primary decommissioning plan is outlined in **Appendix R** to this Joint Proposal.

143. For decommissioning of the New York State Area under NYSDOT jurisdiction, the Certificate Holder shall work with the NYSDPS and/or the NYSDOT to obtain a Performance Bond with Surety. The use of a Performance Bond with Surety is for the convenience of the NYSDOT only and should in no way be interpreted as being precedential or in conflict with the use of letters of credit as it pertains to the securities used for decommissioning the other areas of the Project.

C. Availability and Impact of Alternatives

144. Exhibit 3 to the Application describes the availability and impact of Project alternatives, which are briefly summarized below (Evidentiary Record Exhibit 4). Considering all factors, the Signatory Parties agree that the Project as described in **Appendix B** to the Joint Proposal is preferable to any of the alternatives considered. The selected route has been designed to minimize impacts to wetlands, traffic, and local residents, businesses, maritime industries, recreational uses and resources, sensitive resources, etc.

145. Before filing the Application, the Applicant extensively evaluated and studied multiple alternatives to achieve the Project's purpose, which includes delivery of up to 924 MW of offshore wind energy via a point of interconnection at the Holbrook Substation in the Town.

146. With respect to the OnCS–DC, the Applicant considered four sites as outlined in Evidentiary Record Exhibit 4. Three sites were removed because they were not located close enough in proximity to the Holbrook Substation or would require extensive tree-clearing. The Union Avenue South Site was ultimately selected for the location of the OnCS–DC due to its

proximity to other industrial developments and the Holbrook Substation, and it affords the minimum necessary vegetated areas that would require clearing.

147. The landfall of the SRWEC-NYS at Smith Point County Park was selected out of six alternatives because the site provides sufficient area to accommodate onshore HDD operations with minimal disruption to adjacent land uses, and it minimizes direct disturbance to natural or cultural resources. The route chosen for the Landfall HDD was based on a desktop analysis reviewing geology, shipwrecks, artificial reefs, sand borrow pits, and existing cables. More specifically on the existing cables analysis, the SRWEC-NYS's landfall location was selected, in part, to site the cable in the vicinity where several other existing offshore cables also make landfall.

148. The route for the Onshore Transmission Cable was chosen out of five alternatives due to its location primarily within existing ROW and limited sensitive resources. As outlined in the Certificate Conditions, Phase 1 construction may not commence until the FHWA concurrence has been provided as described above in Paragraph 2.

149. The Signatory Parties recognize that a no-action alternative is not a viable option in light of the State's clean energy goals, including the proliferation of offshore wind generation.

D. The Project's Conformance to Long-Range Plans for Expanding the Electric Power Grid

150. The Project conforms to the New York Independent System Operator's (NYISO's) requirements and planning objectives (*see infra* Paragraph 151), is consistent with New York's long-range plans as required by PSL § 126.1 (e) (2) (*see supra* Point IV), and will contribute towards helping New York State achieve its energy and environmental targets set forth in the CLCPA (*see id*.).

E. System Reliability Impact Study

151. The System Reliability Impact Study (SRIS) required under 16 NYCRR § 88.4 (a) (4) for the Project was issued by the NYISO and is included in this proceeding's administrative record (Record Exhibit 18).

F. State and Local Laws

152. The Project, as proposed in this Joint Proposal, fully complies with the substantive provisions of all applicable State laws, including without limitation, the PSL, ECL, and Agriculture and Markets Law.

153. Due to the preemptive effect of PSL § 130, procedural requirements to obtain any State or local approval, official review, consent, permit, certificate, or other condition for the Project's construction or operation do not apply except for permits or approvals issued or required by the NYSDEC pursuant to regulations implementing federally-delegated environmental programs, NYSDOT permits issued in accordance with Section 52 of the Highway Law, those provided by Article 18 of the New York State Executive Law (Uniform Fire Prevention and Building Code Act) that require issuance of a building permit for construction, alteration, or demolition of a building, those provided by otherwise applicable State law for the protection of employees engaged in construction and operation of the Project, and those approvals expressly authorized in the proposed Certificate Conditions.

154. Exhibit 7 of the Application (Evidentiary Record Exhibit 8) identifies, for each local jurisdiction, every substantive local legal provision (ordinance, law, regulation, standard, and requirement) potentially applicable to the Project, as well as every such local legal provision that the Applicant requests that the Commission not apply because, as applied to the Project, such local

legal provision is unreasonably restrictive in view of the existing technology, factors of costs or economics, or the needs of consumers.

155. Except for those provisions the Applicant specifically requested that the Commission refuses to apply in Exhibit 7, the Applicant will comply with, and the location of the Project as proposed conforms to, all substantive local legal provisions that are applicable to the Project.

156. The following are examples of local laws that the Applicant requests the Commission not apply as well as the corresponding justifications for such requests:

a. Requirements concerning noise and dust emissions because, although mitigation measures will be implemented to the extent practicable to minimize the temporary impacts from construction activities and equipment, these impacts are technologically impossible or would be impracticable from a cost and economics perspective to limit to levels specified in the ordinances;

b. Fence height and screening requirements, permitted use or use permit or approval standards or requirements, and limits on the location of structures or the preservation of particular land designations (*e.g.*, 100-year floodplain) because (a) the Project consists of an underground transmission system with an existing ROW, public parks, or on utility-owned property; (b) the structures within the Project's ROW will be a function of optical width, length, clearance, and reliability criteria, as well as governing requirements (NESC); and/or (c) the needs of consumers are best met by enabling the Applicant to construct the Project and operate and maintain it

safely and reliably pursuant to procedures that are based on NESC, Commission, and reliability standards; and

c. Maximum structure height requirements because compliance is technologically impossible and unsafe given that heights are a function of the appropriate span length between transmission structures as well as clearance, reliability, and safety requirements.

157. On February 16, 2022, the Applicant filed two letters it received from the County and the Town in this proceeding indicating that they have reviewed Revised Exhibit 7 and stating they do not object to the contents therein or the waivers requested (Evidentiary Record Exhibit 21).

158. Notwithstanding that necessary interconnection work may be authorized to be performed under the Certificate and the EM&CP at the LIPA-owned Holbrook Substation, such substation shall not thereafter become subject to Article VII jurisdiction post-construction of the Project solely because of its Article VII authorization.

G. Public Interest, Convenience, and Necessity

159. In addition to the need for the Project discussed above in Point IV (A), the Applicant conducted public outreach regarding the Application prior to filing in order to inform the public about the Project, including:

a. Met with key stakeholders, including State agency staff, State and federal legislators representing the Project area, town and county elected officials, affected town and county agencies, school districts, public safety districts, and abutting landowners, residents, and impacted businesses, public

interest organizations (*e.g.*, fisheries groups), among other parties, informing them of the Project;

b. Presented the Project at stakeholder outreach meetings with elected officials, advocacy organizations, and several local communities' stakeholders;

c. Sent letters to the landowners who will abut the Project, notifying them of the Project and informing them of ongoing survey work and opportunities to engage with the Project team (*e.g.*, community meetings, the Project website, etc.);

d. Held several public open house information sessions both in-person and virtually to accommodate for the COVID-19 pandemic;

e. Established a Project Twitter presence (@SunriseWindNy) that disseminates project information and interacts with members of the public;

f. Established a website at www.sunrisewindny.com, which has been, and will continue to be, updated regularly with current Project information; and

g. Established a toll-free hotline number and an email address to receive inquiries regarding the Project.

160. A public notice (print and digital) was published in *Long Island Advance, South Bay's Neighbor Newspaper, The South Shore Press, The Suffolk Times, Tide of Moriches, and the Village Beacon Record*, for two consecutive weeks prior to filing the Application and for the April 2021 Amended Application. In addition, copies of the Application were provided to the following libraries for public inspection: Brookhaven Free Library, Mastics-Moriches-Shirley Library, and Sachem Public Library.

161. Property owners along the Project's route were sent notification letters regarding the Project's Application filing and the filing of the April 2021 Amended Application. Similarly, additional notifications to abutting landowners were provided at the time the Applicant filed the Holbrook Supplement.

162. Between November 12, 2020 - November 18, 2020 for the Application filing and April 1, 2021 - April 7, 2021 for the Amended Application filing, the Applicant briefed all federal and State legislators representing the Project's route communities.

163. The Applicant has also presented a post-filing Project updates to the County and the Town.

164. Between October 20, 2020 - June 1, 2022, property owners along the Project's ROW were mailed 16 separate Project updates.

165. A Public Statement Hearing was held on September 22, 2021.

166. The Applicant has also created easy to access and use information for the public to learn about the Project such as a general fact sheet and a virtual open house.

167. In response to the Applicant's public outreach efforts, eight public comments have been filed as of the date of this Joint Proposal. Three comments, filed by entities such as the Suffolk County Energy Office, Suffolk County Legislator Bridget Fleming, and Pat Peluso the former President of the Mastic/Shirley Chamber of Commerce, support the Project.

168. In addition, the Project has received approximately 93 project-specific emails and a total of 536 emails since June 23, 2021, and approximately 196 calls to the Project email and hotline, respectively. The Project website has received at least 32,991 visits from unique visitors and 60,524 page views since its launch on April 21, 2020.

169. The Signatory Parties agree that the Applicant has conducted satisfactory public outreach.

170. Further, no above-ground component of the Project will be located in a Potential Environmental Justice Area as defined in the NYSDEC Commissioner Policy 29; therefore, the Project will have no permanent impact in those areas.

H. The Project's Cost

171. The Project's estimated capital cost (in 2020 dollars) is provided in revised, confidential Exhibit 9 of the Application (Evidentiary Record Exhibit 10). The estimated total capital costs of the Project include but are not limited to: (i) ROW acquisition, (ii) route surveys, (iii) materials, (iv) labor, (v) engineering and inspection, (vi) administrative overhead, (vii) fees for legal and other services, and (viii) interest during construction.

172. The Project's construction and operation is anticipated to provide a short-term stimulus to the local and regional economy by increasing employment and earnings in the construction industry, as detailed in Exhibit 6 of the Application (Evidentiary Record Exhibit 7).

173. In addition, both direct and indirect Project-related expenditures will have a positive impact on the local economy by increasing the demand for goods and services and related tax revenues.

174. All Project costs are necessary to support the attainment of the CLCPA and related State policies and clean energy targets.

V. Proposed Commission Findings

175. The record in this proceeding supports all of the Commission findings required by PSL § 126 and as set out in **Appendix C** to this Joint Proposal.

VI. Proposed Certificate Conditions

176. The proposed Certificate Conditions set forth in **Appendix D** to this Joint Proposal are acceptable and appropriate for inclusion in a Certificate of Environmental Compatibility and Public Need authorizing the Project's construction and operation as described therein and in this Joint Proposal. The Certificate Conditions shall control in the event of a discrepancy with text included in remaining sections of the Joint Proposal, including this narrative.

VII. Environmental Management and Construction Plan

177. The specifications for development of the EM&CP set forth in **Appendix E** of this Joint Proposal, and the specifications for the plans to be included as part of the EM&CP Appendices H, I, and K-S, attached hereto, are acceptable for use while preparing the Project's EM&CP, and any deviation therefrom will be described in the EM&CP.

VIII. Water Quality Certification

178. The record in this proceeding supports the water quality certification substantially in the form of Proposed 401 Water Quality Certification set forth in **Appendix F** to this Joint Proposal.

Remainder of page intentionally left blank.

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

SUNRISE WIND LLC

By: Mike Ausere

Name: Michael Ausere
Title: Authorized representative

By:

Name: Patricia DiOrio
Title: Director, North East Offshore, LLC
(sole member of Sunrise Wind LLC)

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

STAFF OF THE DEPARTMENT OF PUBLIC SERVICE

By:
Name: Brian Ossias, Esq.
Title: Staff Counsel

By:
Name: Nicholas Forst, Esq.
Title: Assistant Counsel

By:
Name: Jessie Shaw, Esq.
Title: Assistant Counsel

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

By: Mark D. Sanza
Name: Mark D. Sanza
Title: Deputy Counsel

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

DEPARTMENT OF AGRICULTURE AND MARKETS

By: _____

Name: Tara B. Wells

Title: Senior Attorney

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

DEPARTMENT OF STATE

By: _____
Name: Mark P. Pattison
Title: Deputy Secretary of State for Local Government

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

DEPARTMENT OF TRANSPORTATION

By: _____
Name: Nicolas Choubah
Title: Chief Engineer.

IN WITNESS WHEREOF, the Signatory Parties execute this Joint Proposal as of the day and year first set forth above.

LONG ISLAND COMMERCIAL FISHING ASSOCIATION

By: _____
Name: Bridget O'Toole, Esq.
Title: Counsel to Long Island Commercial Fishing Association

APPENDIX A

EVIDENTIARY RECORD

APPENDIX B

EVIDENTIARY RECORD

Pre-Filed Direct Testimony:

Direct Testimony of Derrik Berg, Kenneth Bowes, William H. Bailey, Drew Carey, John Case, Ryan Chaytors, Raymond Collins, Benjamin R.T. Cotts, Lorianne DeFalco, Francis Dubois, Michael G. Evans, Grant Johnson, Daniel J. Mennitt, Anna Murphy, John Neill, Daniel G. Nein, Gordon W. Perkins, Douglas J. Pippin, Joy Y. Prescott, Demetrios Sakellaris, Matthew F. Shultz, and Elizabeth Weatherby (co-sponsoring or sponsoring Evidentiary Record Exhibits 1-16).[1]

Evidentiary Record Exhibits:[2]

Exhibit 1: The Cover Letter filing the Application with enclosures, the Application, and Appendices 1-A through 7-A filed therewith.

Exhibit 2: General Information (Exhibit 1 of the Application).

Exhibit 3: Location of Facilities (Exhibit 2 of the Application).

Exhibit 4: Alternatives (Exhibit 3 of the Application).

Exhibit 5: Environmental Impacts (Exhibit 4 of the Application).

Exhibit 6: Design Drawings (Exhibit 5 of the Application).

Exhibit 7: Economic Impacts (Exhibit 6 of the Application).

Exhibit 8: Local Ordinances (Exhibit 7 of the Application).

Exhibit 9: Other Pending Filings (Exhibit 8 of the Application).

Exhibit 10: Cost of Proposed Facility (Exhibit 9 of the Application).

Exhibit 11: Description of Proposed Transmission Line (Exhibit E-1 of the Application).

Exhibit 12: Other Facilities (Exhibit E-2 of the Application).

[1] The listed pre-filed direct testimony is available electronically on the Public Service Commission's ("Commission") Document and Matter Management ("DMM") site as Appendix 1-C to Sunrise Wind LLC's ("Sunrise") Article VII application filed on December 9, 2020.

[2] Certain Evidentiary Record Exhibits were filed in redacted form on DMM. The confidential versions of those exhibits were provided to the Commission's Records Access Officer or the presiding Administrative Law Judge. All Evidentiary Record Exhibits, aside from discovery responses (Exhibit 24), are available on DMM in full or redacted form. All references to Application appendices and exhibits listed in this evidentiary record refer to the final version available on DMM (*e.g.*, Exhibit 4 to the Application is Revised Exhibit 4 filed on April 12, 2021, and Exhibit 7 to the Application is Revised Exhibit 7 filed on April 22, 2022).

Exhibit 13: Underground Construction (Exhibit E-3 of the Application).

Exhibit 14: Engineering Justification (Exhibit E-4 of the Application).

Exhibit 15: Effect on Communications (Exhibit E-5 of the Application).

Exhibit 16: Effect on Transportation (Exhibit E-6 of the Application).

Exhibit 17: Onshore Update Filing (Onshore Ecological Assessments and Field Survey Reports, Project Route and HDD Workspace Within Southaven County Park, and Carmans River Proposed Trenchless Crossing at Victory Ave), made on May 10, 2021.

Exhibit 18: First (Deficiency Responses 1-24) and Second Deficiency Response Package (Deficiency Responses 1-5), filed on April 12, 2021 and June 2, 2021, respectively.

Exhibit 19: Letter from Secretary Phillips Regarding Application Compliance, filed July 1, 2021.

Exhibit 20: Complete Project Updates Filing, made on January 28, 2022 (including, for example, updated Appendix 4-D2 [Phase 1B survey report]).

Exhibit 21: County and Town Letters Regarding Exhibit 7, filed on February 16, 2022.

Exhibit 22: Appendix 4-K, Sediment Chemistry, filed on February 16, 2022.

Exhibit 23: Holbrook Substation Expansion Filing, made on April 22, 2022.

Exhibit 24: Pine Barrens Commission Hardship Decision, filed May 4, 2022.

Exhibit 25: Discovery Responses Served by Sunrise Wind LLC to DPS-001-003, DPS-006, DPS-008-009; DEC-001 (without attachments) and DEC-002; and LICFA-001 and LICFA-002 (without attachments).[3]

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[3] These discovery responses are enclosed with this appendix as they are not available on DMM (*see supra* n 2).

APPENDIX B

DESCRIPTION AND LOCATION OF PROJECT

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DESCRIPTION AND LOCATION OF PROJECT

A. General Project Description

Sunrise Wind LLC's (the Applicant) project will involve: (i) one high-voltage direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 5.2 miles (mi) (8.4 kilometers [km]) in length in New York State (NYS) waters and up to 1,152 feet (ft) (351 meters [m]) located onshore (i.e., above the Mean High Water Line [MHWL], as defined by the United States Army Corps of Engineers [USACE] [33 Code Federal Regulations (CFR) 329.12]) and underground, up to the transition joint bay (TJB) (the SRWEC–NYS); (ii) a DC underground transmission circuit (320 kV) up to 17.5 mi (28.2 km) in length primarily within existing roadway rights-of-way (ROW) and concrete and/or direct buried splice vaults, which will include other associated components (the Onshore Transmission Cable); (iii) an onshore converter station that will transform the project's voltage from 320 kV DC to 138 kV alternating current (AC) (the OnCS–DC); (iv) two AC underground circuits (138 kV) approximately 1.1 mi (1.8 km) in length, which will connect the new OnCS–DC to Long Island Power Authority's (LIPA's) existing Holbrook Substation (the Onshore Interconnection Cable); (v) fiber optic cables co-located with both the Onshore Transmission Cable and Onshore Interconnection Cable; (vi) temporary laydown yards; and (vii) the expansion of the Holbrook Substation to accept the Onshore Interconnection Cable (the Holbrook Substation Expansion). The SRWEC–NYS, Onshore Transmission Cable, OnCS–DC, Onshore Interconnection Cable, fiber optic cables, temporary laydown yards, and the Holbrook Substation Expansion shall collectively be referred to herein as the "Project." The transition of the SRWEC–NYS to the Onshore Transmission Cable will occur where the cables

are spliced together at the TJB located at the work area within Smith Point County Park on Fire Island in the Town of Brookhaven, Suffolk County, New York (the Landfall Work Area).

The Applicant identified corridors to provide flexibility for siting and construction, as described in Certificate Condition 2. The Applicant proposes to certify these corridors (together, the Project Corridor), such that the location of the centerline for the Project within the Project Corridor will be refined during preparation of the Project's Environmental Management and Construction Plan (EM&CP). The Project Corridor extends only to the areas delineated in this Appendix B. The construction, operation, maintenance, repair, and decommissioning activities of the Project will be further detailed in the EM&CP, but the Project Corridor will not be expanded without an amendment to this Certificate.

The Project and Project Corridor are described further below and are depicted on the Location of Sunrise Wind New York Cable Corridor maps included as Attachment 1 to this Appendix B.

B. SRWEC–NYS

The SRWEC–NYS will be up to 5.2 mi (8.4 km) in NYS territorial waters and up to 0.2 mi (1152 ft or 0.35 km) onshore. The SRWEC–NYS will enter NYS territorial waters at a point 3 nautical miles (nm) offshore and will be routed in NYS territorial waters for up to 4.8 mi (7.7 km) in a northwest direction toward Fire Island until a point approximately 2,225 ft (678 m) offshore from the MHWL. The SRWEC–NYS portion of the Project Corridor width varies between approximately 1,434 ft and 1,878 ft (437 and 572 m) depending on water depth.[1] The width of the

[1] The Project Corridor is inclusive of excavation and backfill for the HDD exit. The corridor approaching landfall includes the area of survey required for the Project Corridor. Near the HDD exit point, the area is approximately 2,500 ft (762 m) wide. At its widest point, this area is approximately 3,600 ft (1,097 m) wide (see Attachment 1 to this Appendix B). The corridor will be reduced in the EM&CP. Jet trencher trials will be undertaken along a section adjacent to the planned cable route, within the Project Corridor, outside the 98 ft (30 m) disturbance corridor.

disturbance corridor for installation of the SRWEC–NYS will be up to 98 ft (30 m), inclusive of any required seabed preparation (i.e., pre-lay grapnel run and boulder clearance). The requested operational ROW is only 30 ft (9 m). The maximum permanent limit of disturbance will be significantly less than the temporary maximum limits of disturbance.

The Applicant will land the SRWEC–NYS utilizing horizontal directional drilling (HDD) methodology (the Landfall HDD). The HDD methodology will require temporary use of both (a) the Landfall Work Area located onshore within which the TJBs will be installed and HDD construction activities will occur, including cable pull in activities, and (b) the Burma Road Pipe Stringing Area located onshore within which the conduit pipe will be placed temporarily prior to maneuvering offshore.

The SRWEC–NYS, installed via HDD, will travel in a northwest direction from the Landfall HDD exit point for approximately 3,280 ft (1,000 m) to the Landfall HDD entry point within the paved Smith Point County Park parking lot on Fire Island in the Town of Brookhaven. Two segments of the SRWEC–NYS will be installed via the Landfall HDD, including a segment that will be installed offshore (approximately 2,225 ft [678 m] seaward from the MHWL) and a segment that will be installed onshore (approximately 1,054 ft [321 m] landward from the MHWL). In addition, approximately 98 ft (30 m) will be installed underground from the Landfall HDD entry point to the TJB in Smith Point County Park.

The TJB will be up to 82 ft x 16 ft x 16 ft (25 m x 5 m x 5 m). For each fiber optic cable, a joint box and link box will be required and will be installed in an additional concrete pit up to approximately 6.6 ft x 6.6 ft x 6.6 ft (2 m x 2 m x 2 m). The TJB, link boxes, and fiber optic cable boxes will be located entirely within the Landfall Work Area at Smith Point County Park. The Landfall Work Area will require a temporary use of an approximately 570 ft x 500 ft (82 m x 152

m) area within the existing, paved parking lot. Some equipment and materials required for the Landfall HDD, Intracoastal Waterway Horizontal Direct Drilling (ICW HDD), and the section of the Onshore Transmission Cable between these HDDs, will be transported via barge to Smith Point County Park due to existing weight limit restrictions on the Smith Point Bridge. A temporary landing structure will be installed at Smith Point County Park to aid in the offloading of equipment/materials. The temporary landing structure will be designed in accordance with Certificate Condition 81.[2]

C. Onshore Transmission Cable

The transition of the SRWEC–NYS and Onshore Transmission Cable will occur where the cables are spliced together at the TJB located at the Landfall Work Area at Smith Point County Park. From the Landfall Work Area, the Onshore Transmission Cable will travel up to 17.5 mi (28.2 km) in length to the OnCS–DC as described below. The route for the Onshore Transmission Cable is located primarily within existing disturbed ROW. Within the public ROW, the Onshore Transmission Cable portion of the Project Corridor consists of the full extent of the ROW (property line to property line) and, during construction, will typically require a temporary disturbance width of up to 30 ft (9 m), excluding disturbance areas for trenchless crossing locations and splice vaults. Once installed, the typical operational corridor will be approximately 5 ft (1.5 m), (excluding splice vault locations) within typically 20-foot wide easements to be obtained by the Applicant.

From the TJB within the Landfall Work Area, the Onshore Transmission Cable will run parallel to Fire Island Beach Road within the paved Smith Point County Park parking lot approximately 2,000 ft (610 m) west, crossing the William Floyd Parkway to a recreational area

[2] The corridor for the temporary landing structure includes the area of survey required for the location of the landing structure. At its largest, this area is approximately 109,500 sq ft (10,173 sq m) (see Attachment 2 to this Appendix B). The corridor will be reduced upon completion of design of the landing structure.

located to the west of William Floyd Parkway. The Onshore Transmission Cable will then be routed across the intracoastal waterway (ICW) in a northwest direction via an ICW HDD approximately 0.5 mi (0.8 km) in length within a corridor width of 260 ft (79 m) to a paved parking lot within the Smith Point Marina along East Concourse Drive. From the ICW work area (the ICW Work Area), the Onshore Transmission Cable will be routed north for approximately 800 ft (0.24 km) before turning east for approximately 550 ft (0.2 km) following East Concourse Drive. The Onshore Transmission Cable will then extend north approximately 3.6 mi (5.8 km) along William Floyd Parkway to the intersection with Surrey Circle. The Onshore Transmission Cable will be routed along Surrey Circle for approximately 0.1 mi (0.2 km) and will continue north along Church Road. The Onshore Transmission Cable will travel west along Mastic Boulevard for approximately 0.2 mi (0.3 km) to the intersection with Francine Place and then turn north on Francine Place for approximately 0.1 mi (1.6 km) to the intersection with Montauk Highway. The Onshore Transmission Cable will cross Montauk Highway to Revilo Avenue and will continue north along Revilo Avenue for approximately 0.07 mi (0.1 km) to the work area for the Sunrise Highway crossing. The Onshore Transmission Cable will cross Sunrise Highway via trenchless methods to Revilo Avenue, continuing north to the intersection with Victory Avenue and then continuing west on Victory Avenue for approximately 2.1 mi (3.4 km) to Horseblock Road. The Onshore Transmission Cable will continue northwest along Horseblock Road for approximately 3.2 mi (5.1 km). The Onshore Transmission Cable will turn north and cross the Long Island Rail Road (LIRR) to Long Island Avenue via trenchless methods[3]. The Onshore Transmission Cable will then be routed west along the Long Island Expressway (LIE) South Service Road for approximately 4.1

[3] The corridor at the LIRR crossing covers the area required for alternative crossing locations. At its widest point, this area is approximately 780 ft (238 m) wide (see Attachment 1 to this Appendix B). The corridor will be reduced upon selection of the LIRR crossing location.

mi (6.8 km) and continue to Waverly Avenue where it will turn south for approximately 0.4 mi (0.6 km) to Long Island Avenue. The Onshore Transmission Cable will then follow Long Island Avenue west to Union Avenue to the OnCS–DC.

D. OnCS–DC

Power from the Project will be delivered to the electric grid via a new OnCS–DC to be constructed in the Town of Brookhaven. The purpose of the new OnCS–DC is to support the Project's interconnection to the existing electrical grid by transforming the Project voltage to 138 kV AC.

The Union Avenue Site is located on the south side of Union Avenue in the Town of Brookhaven, this 7-acre (2.8-ha) site is located on two parcels to be improved jointly as a common development. The site is bound to the north by Union Avenue; to the east by commercial development; to the south by the LIRR and commercial development; and to the west by commercial and industrial development. This site is located in the Town of Brookhaven's L1 zoning district. This site is currently minimally vegetated and contains gravel and paved locations, multiple buildings, and equipment storage areas associated with various commercial developments.

Construction of the OnCS–DC is anticipated to result in up to 7 acres (2.8 ha) of disturbance, inclusive of permanent footprint and temporary disturbance, with the final operations site up to 6 acres (2.4 ha) in size. The entire station footprint area will be graveled and surrounded by a perimeter fence. Access will be provided through a minimum of one drive-through gate and one walk-through gate.

E. Onshore Interconnection Cable

Interconnection to the electric grid will occur at the existing Holbrook Substation also located in the Town of Brookhaven, via the Onshore Interconnection Cable. The Onshore Interconnection Cable will begin at a set of termination structures located at the OnCS–DC and will be routed entirely underground along town roads and existing utility-owned or controlled property up to 1.1 mi (1.8 km) in length and connect to the existing Holbrook Substation. An expansion of the Holbrook Substation will be required to accommodate the Project.

Construction of the Onshore Interconnection Cable will require a temporary disturbance width of up to 45 ft (13.7 m), excluding disturbance areas for trenchless crossing locations. Once installed, the typical operational corridor for each of the 138-kV circuits will be approximately 30 ft (6.1 m) and within easements to be obtained by the Applicant.

F. Holbrook Substation Expansion

To accept power generated by the Sunrise Wind Farm (SRWF) and delivered by the Project, LIPA's existing Holbrook Substation will require certain modifications, including, but not limited to a fence line expansion and additional electrical equipment and bus work, all of which will be located within an area approximately 225 ft (68.6 m) by 291 ft (88.7 m) and located on the existing parcel that the Holbrook Substation sits. In addition, as a result of the substation reconfiguration, several existing 138 kV and 69 kV overhead transmission circuits will have to be relocated, re-terminated, reconfigured, and/or undergrounded to support the substation expansion. The preliminary design will relocate and replace several of the existing overhead transmission structures with new overhead transmission structure made of galvanized steel.

The existing Holbrook Substation is located on existing utility-owned land north of the LIE Interstation (1-495) in the Town of Brookhaven. The Holbrook Substation is located on one (1)

parcel, approximately 25 acres (10 ha) in size and is bound to the east and west by residential properties, to the north by an existing utility ROW, and to the south by the LIE (I-495). Portions of the existing Holbrook Substation parcel are located within three distinct Town of Brookhaven Zoning Districts, including the L Industrial 1, B Residence, and C Residence zoning districts.

The maximum area of land disturbance associated with the construction of the Holbrook Substation Expansion and transmission line relocations will be approximately 5.0 acres (2.0 ha), and the final footprint of the Holbrook Substation Expansion will be approximately 2.0 acres (0.8 ha), with the remaining area used for construction temporary workspace/staging/laydown areas.

***

Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–OCS)
- Sunrise Wind Export Cable (SRWEC–NYS)
- Landfall HDD A
- ICW Work Area
- Landfall Work Area
- Pipe Sea Access
- Pipe Stringing Area
- Sunrise Wind New York Cable Corridor
- 3-Nautical Mile State Water Boundary
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NOAA Chart 12352 Shinnecock Bay to East Rockaway Inlet

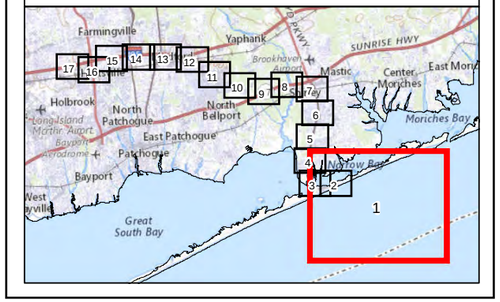
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 2,500 feet
0 0.5 nm
0 1 km

N

Scale at 11x17: 1:31,680
NAD 1983 2011 UTM Zone 18N

REFERENCE MAP



Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- Landfall HDD A
- Onshore Transmission Cable–LIE Service Road Route
- Landfall Work Area
- Pipe Sea Access
- Pipe Stringing Area
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

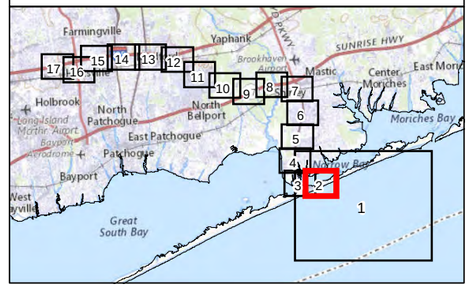
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

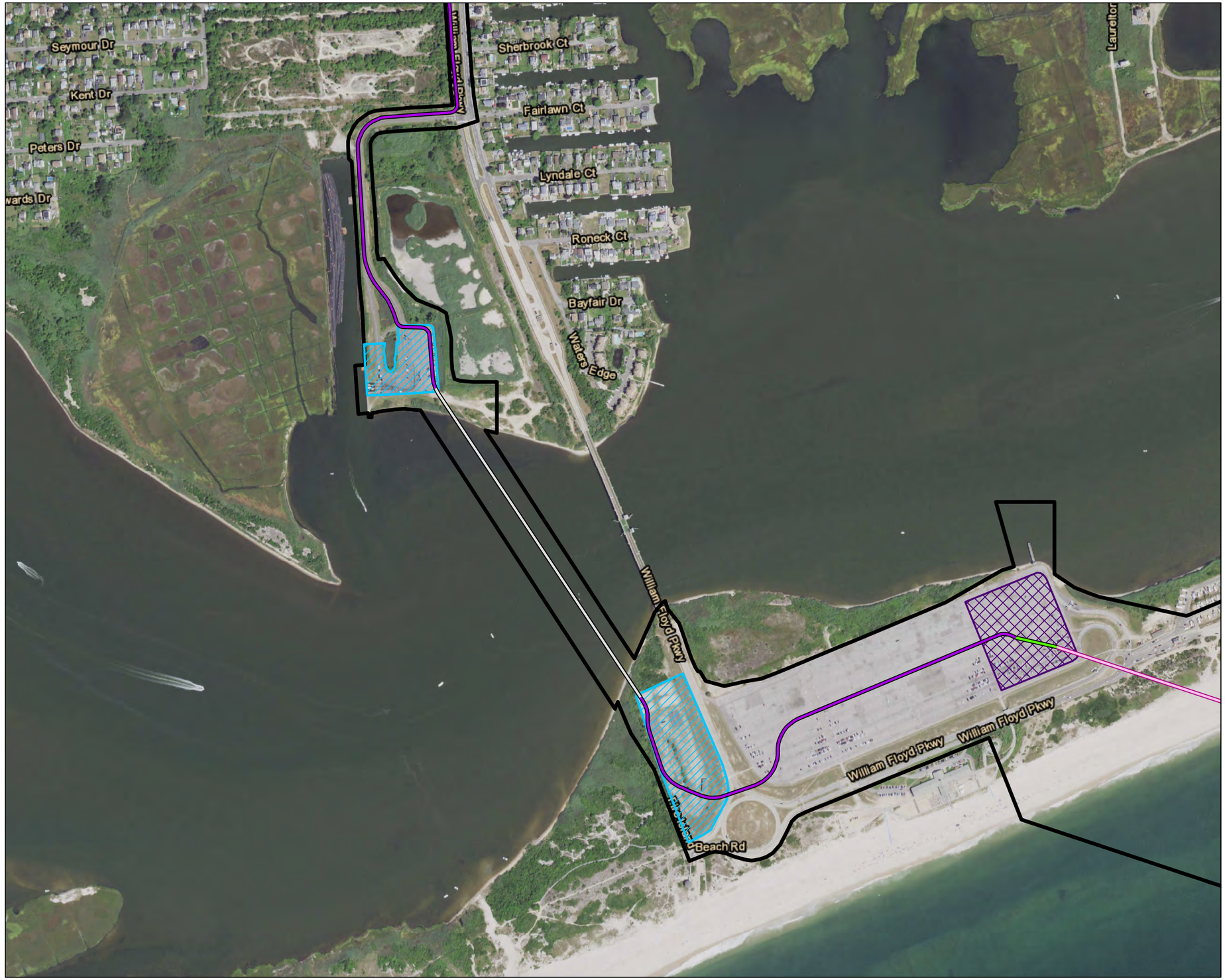
0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP





Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Sunrise Wind Export Cable (SRWEC–NYS)
- Landfall HDD A
- Intracoastal Waterway HDD (ICW HDD)
- Onshore Transmission Cable–LIE Service Road Route
- ICW Work Area
- Landfall Work Area
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes
1. The cable centerline is indicative and subject to final engineering and design.

Sources
NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

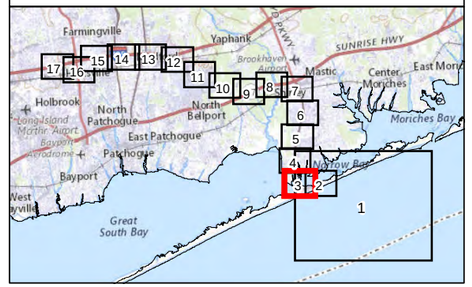
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



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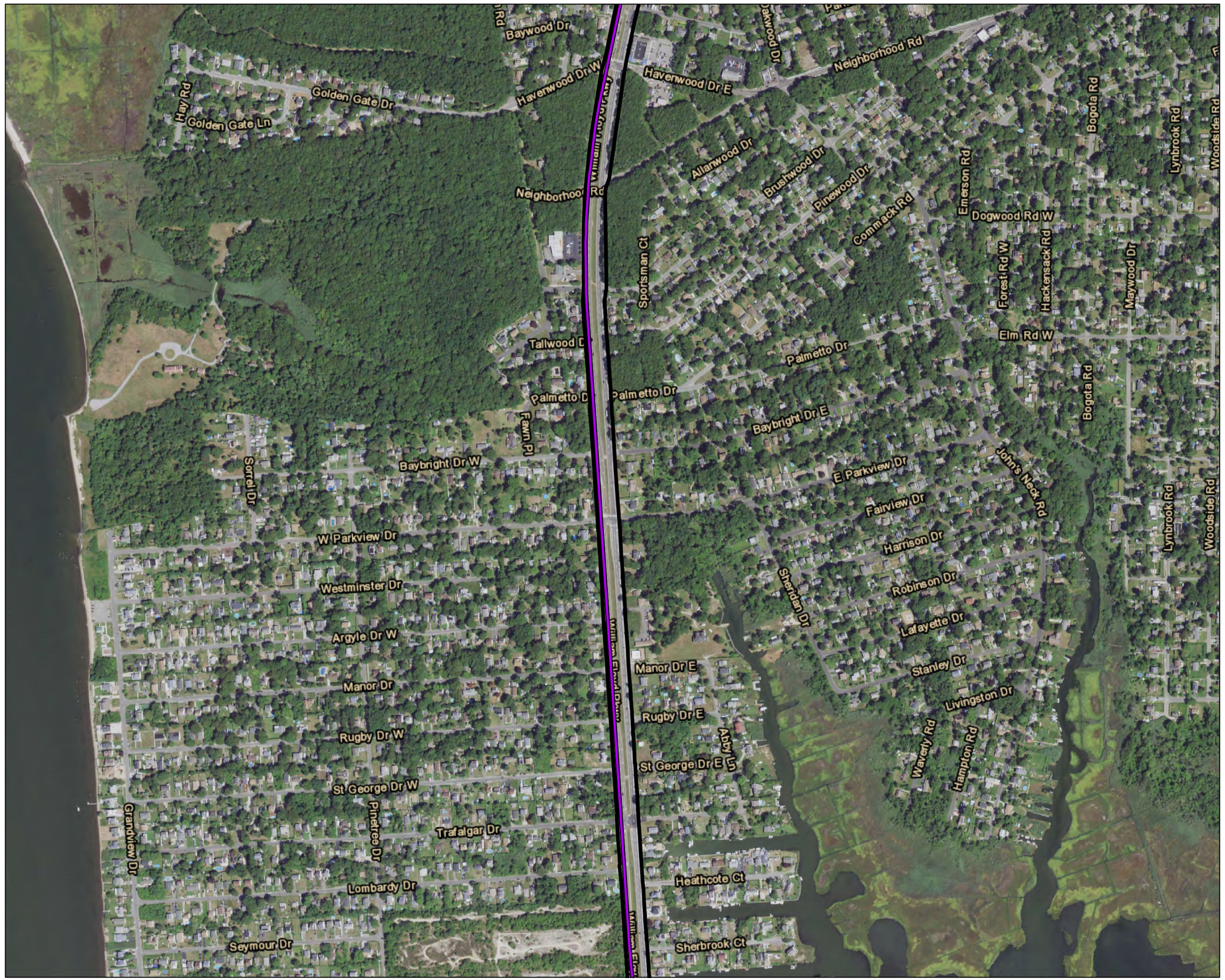


Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

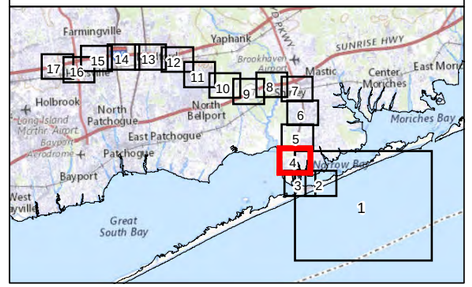
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



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Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

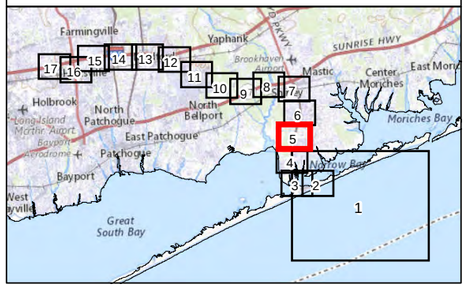
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

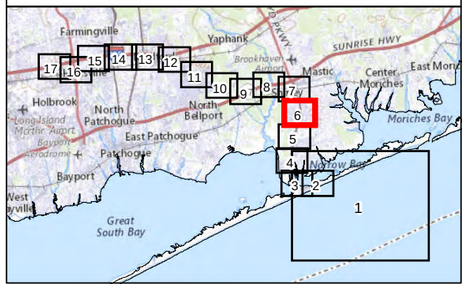
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Onshore Transmission Cable–LIE Service Road Route
- Carmans River Work Area
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes
1. The cable centerline is indicative and subject to final engineering and design.

Sources
NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

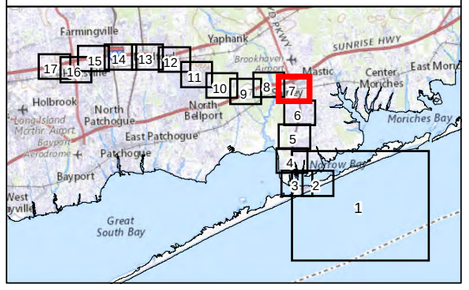
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

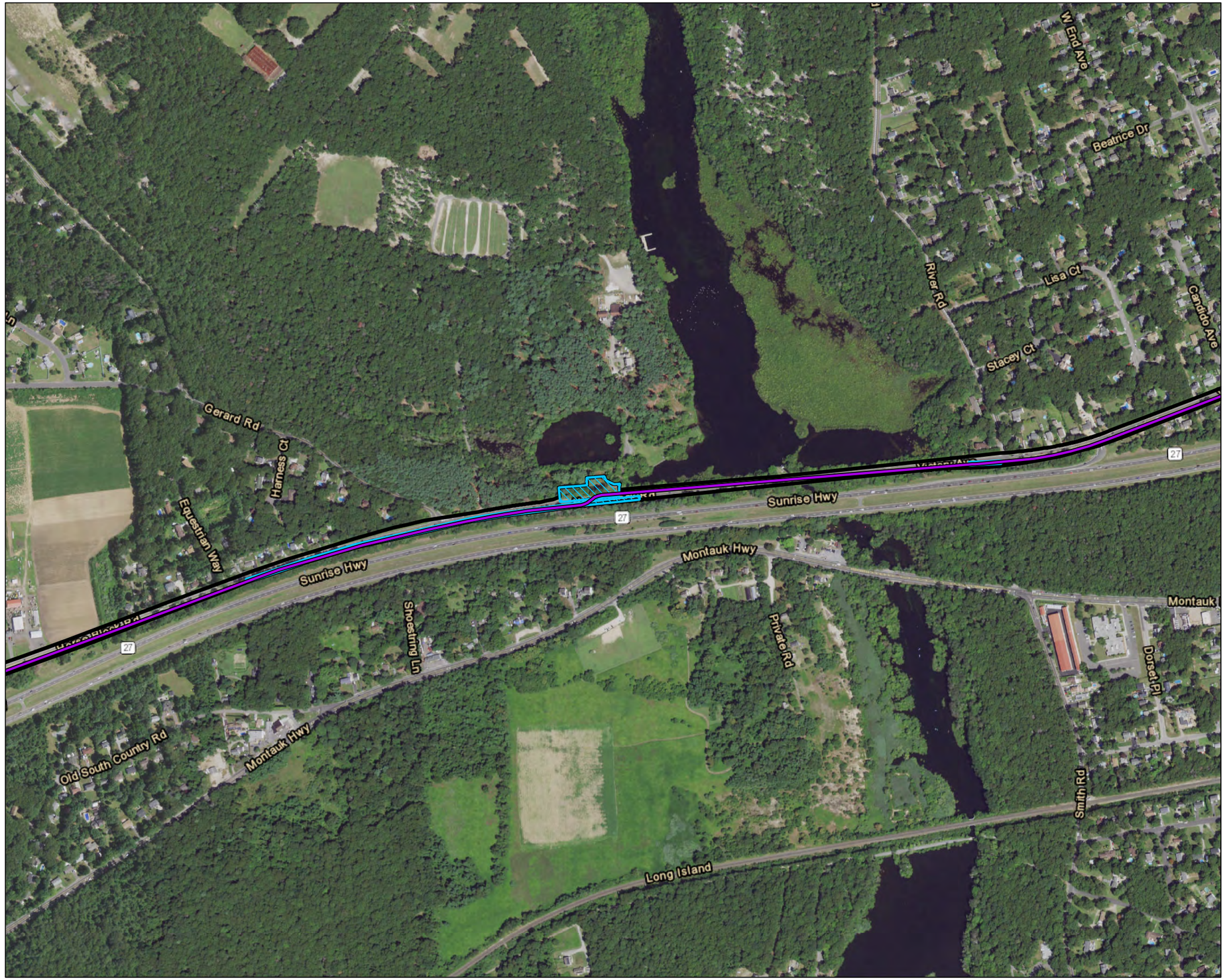
0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP





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Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Carmans River Work Area
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

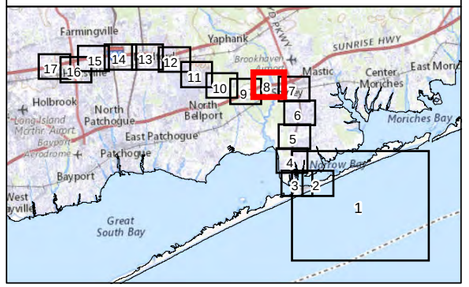
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Onshore Transmission Cable–LIE Service Road Route
- Carmans River Work Area
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes
1. The cable centerline is indicative and subject to final engineering and design.

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Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

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0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

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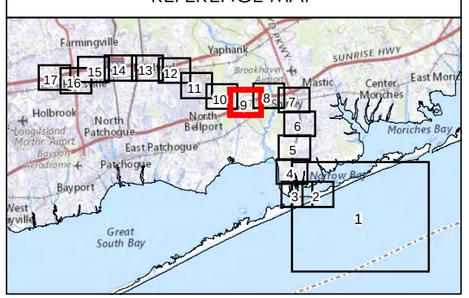

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Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes
1. The cable centerline is indicative and subject to final engineering and design.

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Prepared By	GC
Reviewed By	JYP

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0 0.2 km

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Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

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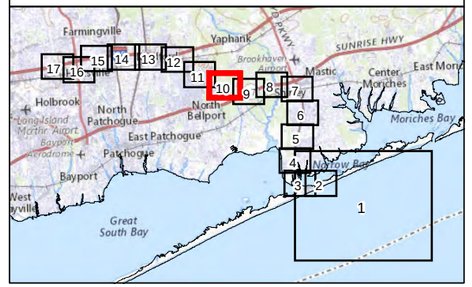

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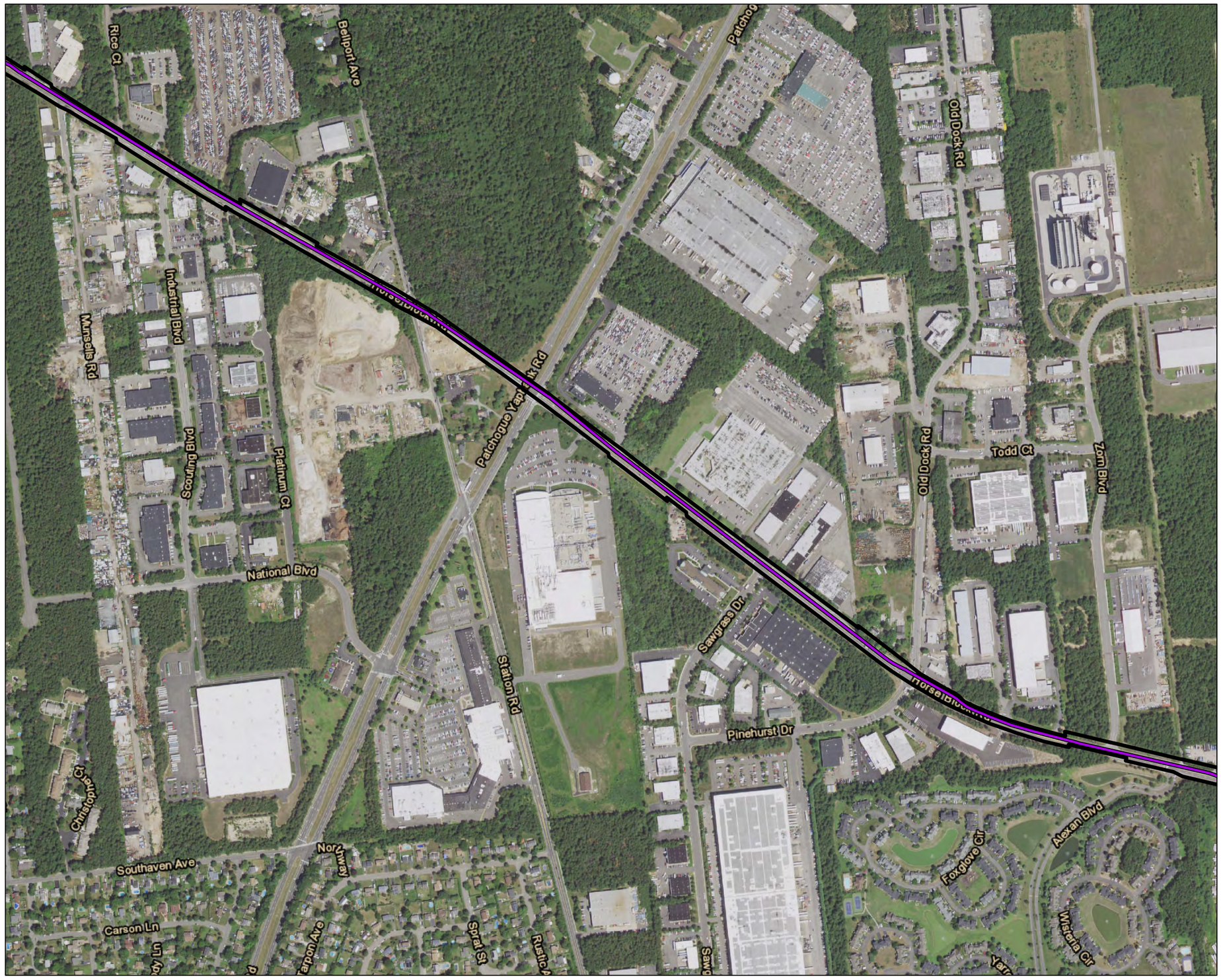


Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

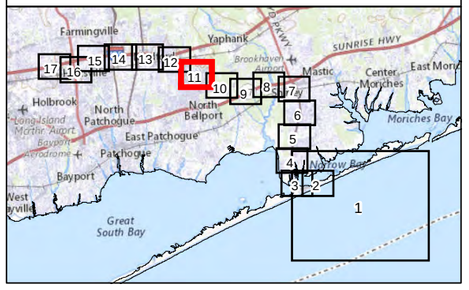
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

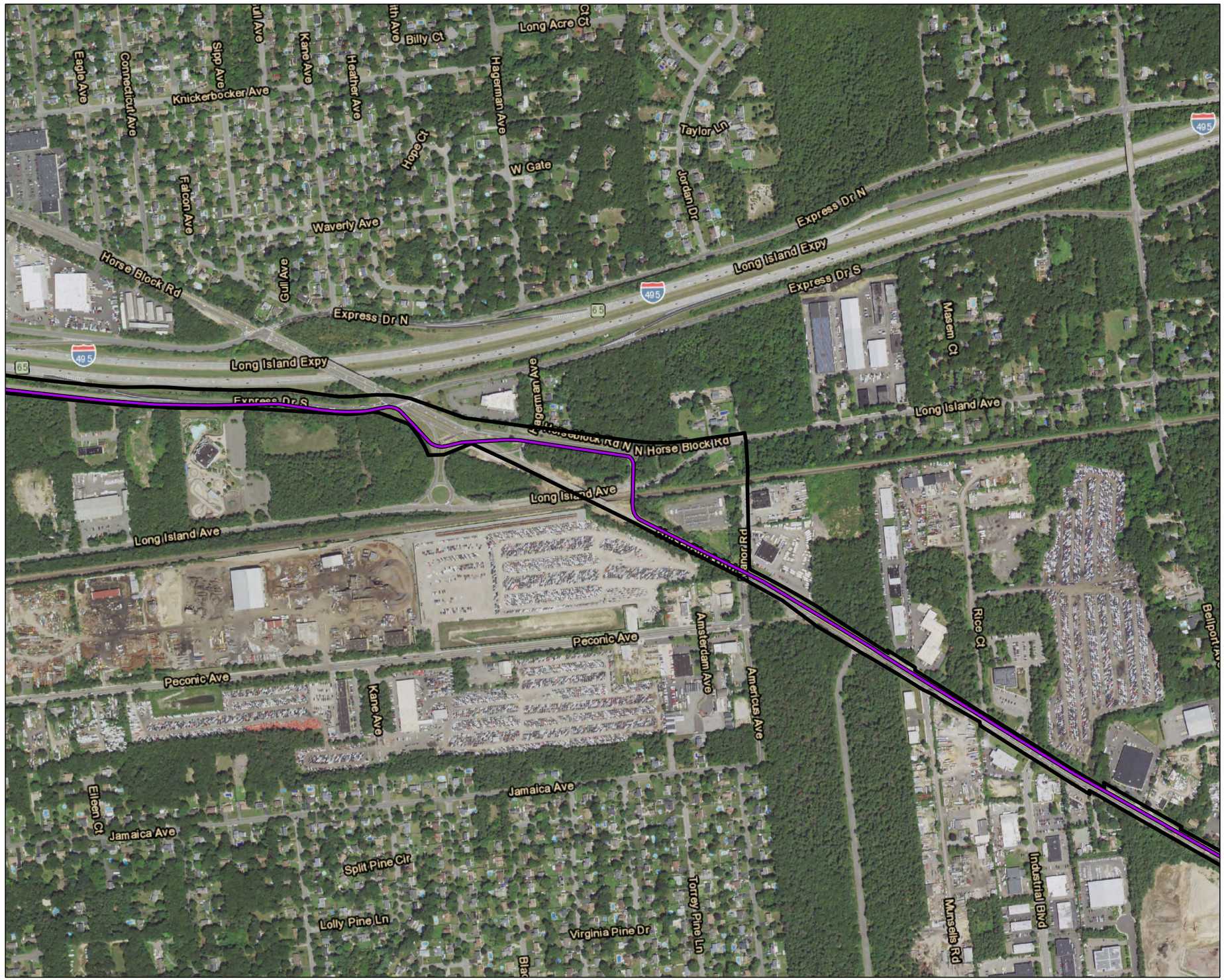
0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP





Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

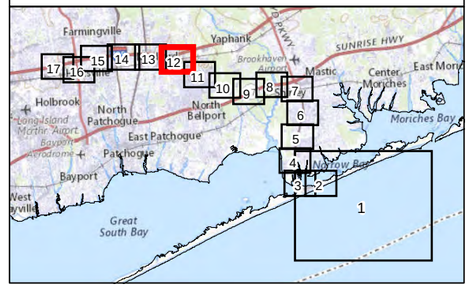
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

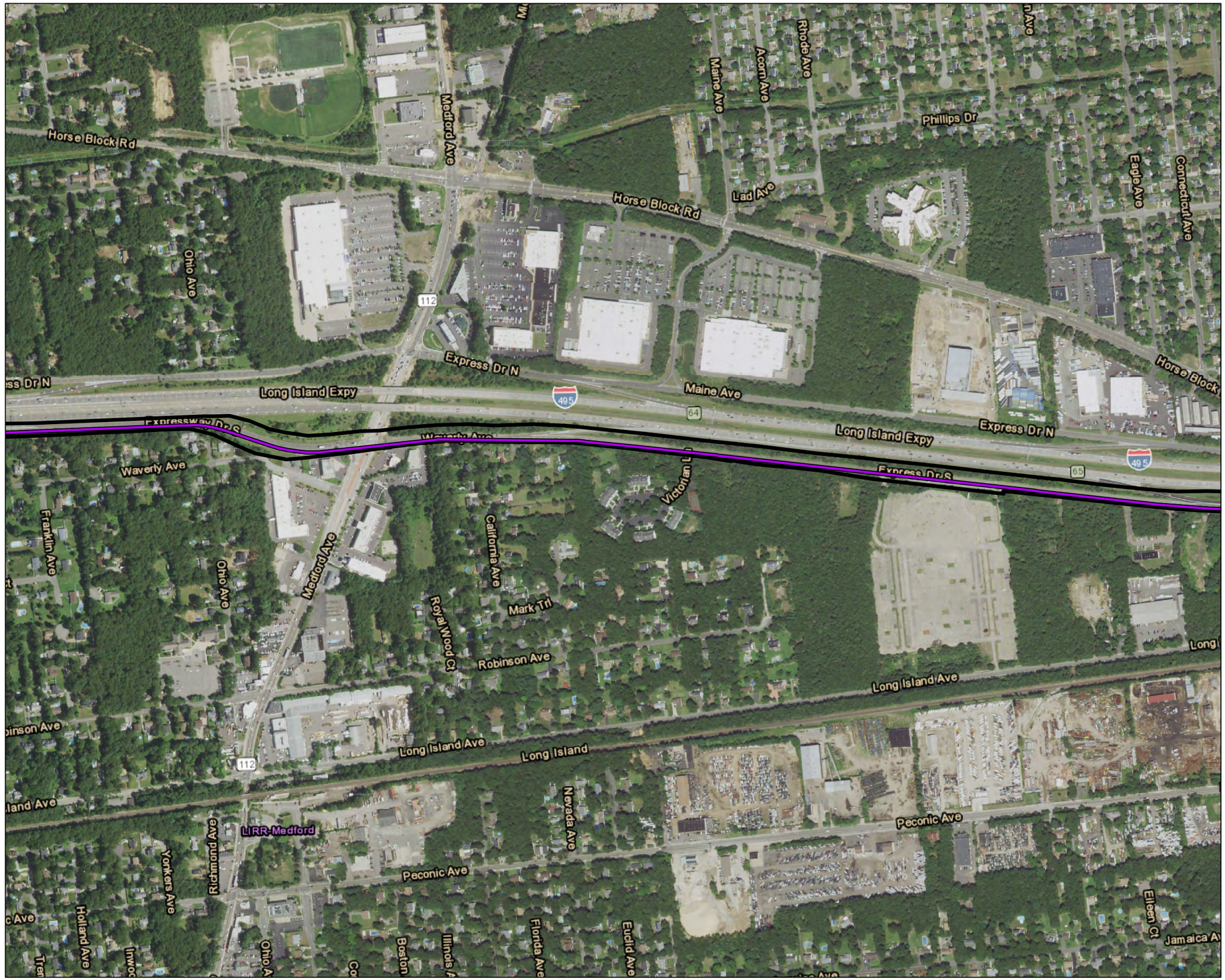
0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP





Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

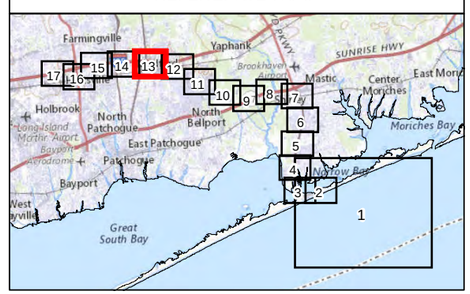
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

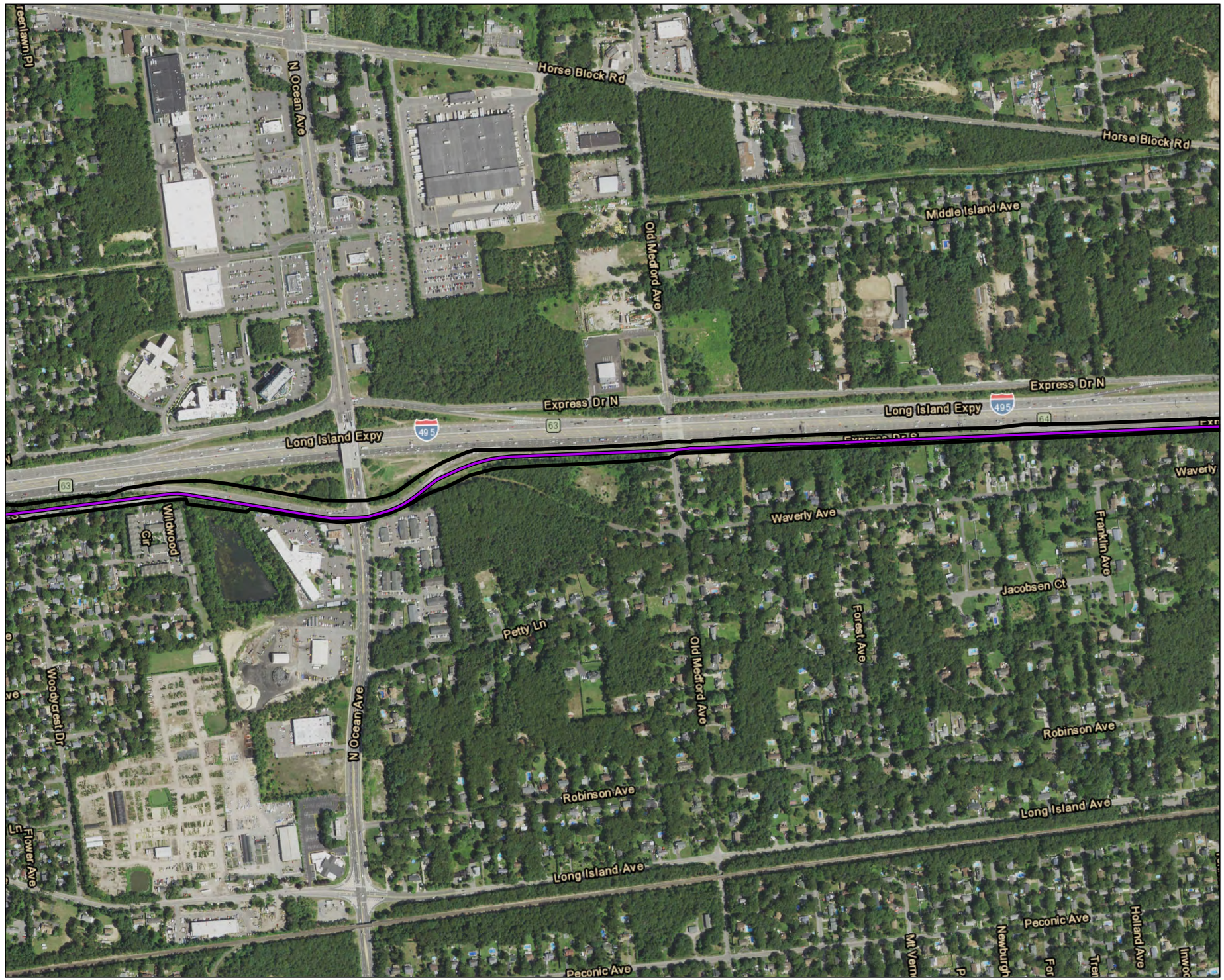
0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP





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Location of Sunrise Wind
New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes
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NAIP 2019

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Project Number	2028113199
Prepared By	GC
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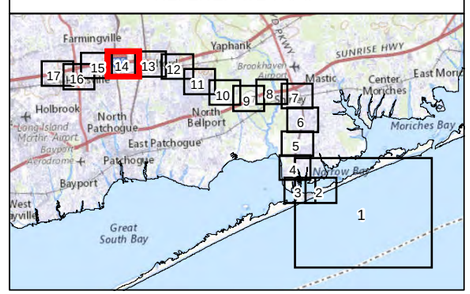
0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Sunrise Wind New York Cable Corridor
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

Sources

NYS GIS Clearinghouse
BOEM Submerged Lands Act (SLA) Boundary, 2017
NAIP 2019

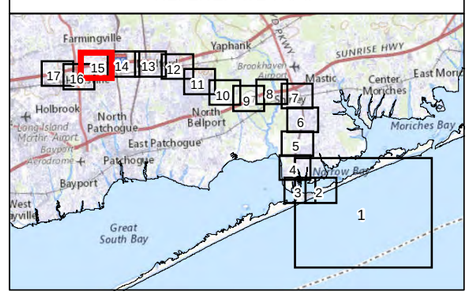
Date	06/17/2022
Project Number	2028113199
Prepared By	GC
Reviewed By	JYP

0 600 feet
0 0.1 nm
0 0.2 km

N

Scale at 11x17: 1:7,200
NAD 1983 2011 UTM Zone 18N FT

REFERENCE MAP



Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend
- Onshore Transmission Cable–LIE Service Road Route
- Onshore Interconnection Cable Route
- Sunrise Wind New York Cable Corridor
- Union Avenue Site
- Town Boundary

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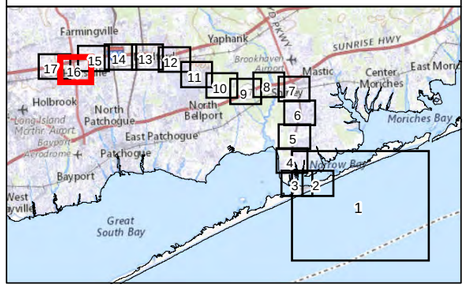

Location of Sunrise Wind New York Cable Corridor

Sunrise Wind | Powered by Ørsted & Eversource

Legend

- Onshore Transmission Cable–LIE Service Road Route
- Onshore Interconnection Cable Route
- Sunrise Wind New York Cable Corridor
- Union Avenue Site
- Holbrook Substation
- Town Boundary

Notes

1. The cable centerline is indicative and subject to final engineering and design.

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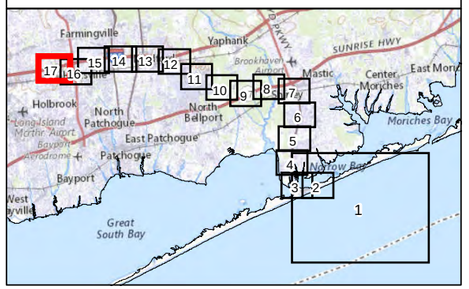

APPENDIX C

PROPOSED COMMISSION FINDINGS

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PROPOSED COMMISSION FINDINGS

1. Based upon the information provided in the Evidentiary Record Exhibits 1, 3 and 11, and 14, there is a need for Sunrise Wind LLC's (the Certificate Holder) Sunrise Wind New York Cable Project (the Project). The purpose of the Project is to transmit electricity generated by the Sunrise Wind Farm (SRWF) to the new Onshore Converter Station (the OnCS–DC) via the submarine segment of the export cable (SRWEC), located in both federal and New York State (NYS or State) waters and the terrestrial underground segment of the transmission cable (the Onshore Transmission Cable), before interconnecting with the State's existing electric grid at the Long Island Power Authority's Holbrook Substation via an interconnection cable (the Onshore Interconnection Cable). The Onshore Transmission Cable, OnCS–DC, Onshore Interconnection Cable, and Holbrook Substation (collectively, the Onshore Facilities) are all located in the Town of Brookhaven, Suffolk County, New York.

2. The Project will provide clean, reliable offshore wind energy that will increase the amount and availability of renewable energy to NYS while creating the opportunity to displace electricity generated by fossil fuel-powered plants and offering substantial economic and environmental benefits. In 2015, NYS adopted the 2015 NYS Energy Plan (SEP) serving as a roadmap to advance the Reforming the Energy Vision (REV) agenda. Among other clean energy goals, the SEP set forth NYS's long-term goal to provide 50 percent of its electricity from renewable resources by 2030 (the 50 by 30 goal). The SEP included an offshore wind initiative to encourage long-term and strategic regulatory coordination for large-scale offshore wind projects, resulting in the NYS Public Service Commission's (the Commission) issuance of an order to implement the Clean Energy Standards (CES or CES Order). The CES Order requested New York State Energy Research Development Authority (NYSERDA) to lead a research, analysis, and outreach program to evaluate the potential for offshore wind energy in NYS resulting in the Offshore Wind Master Plan, and a report titled "Offshore Wind Policy Options" paper (the Options Paper) that served as a roadmap for

meeting the State's goal of 2,400 MW of offshore energy generation by 2030. In 2018, as a result of the Options Paper and completion of a Generic Environmental Impact Statement (GEIS), the Commission issued an Order Adopting the Offshore Wind Standard, setting the stage for the State's first phase of procurements for offshore wind. In response to this expressed need, the Certificate Holder was one of two developers selected and executed a contract with NYSERDA for a 25-year Offshore Wind Renewable Energy Certificates (OREC) Agreement in October 2019. Since that time, the Climate Leadership and Community Protection Act (CLCPA) was enacted which requires the State to procure 9 gigawatts of offshore wind energy by 2035.

3. Under the OREC Agreement, NYSERDA will purchase ORECs generated by the operational SRWF and make them available for purchase by NYS load-serving entities. The SRWF and this Project are being developed to fulfill the Certificate Holder's obligations to New York in accordance with its OREC Agreement. As specified in the OREC Agreement, the Project will generate electricity from the SRWF located in a lease area for delivery to the Holbrook Substation. Importantly, the Project will contribute to NYS's clean energy goals and help the State achieve the offshore wind energy goal codified in the CLCPA.

4. Based upon the information provided in the Evidentiary Record Exhibits 4, 14, and 18, the Project conforms to the New York Independent System Operator, Inc.'s requirements and planning objectives and is consistent with the State's long-range plans for the expansion of transmission facilities. The Project will contribute towards helping the State achieve its energy and environmental targets set forth in the CLCPA based on the required Commission finding in PSL § 126.1 (e) (2).

5. Based upon the information provided in Evidentiary Record Exhibits 1, 3, 4, 5, 6, 7, 11, 12, 14, 15, 16, 20, 22, 23, and 24, the Project will be designed, constructed, and operated in a manner that avoids or minimizes any significant impacts to environmental resources to the extent practicable. The nature of the probable environmental impacts resulting from the Project includes:

a. temporary construction impacts, which will be minimized by the use of existing transportation corridors to the maximum extent practicable and by following appropriate construction techniques described in the Certificate Conditions;

b. minimal incremental visual impacts from the construction of the Onshore Facilities;

c. temporary construction and maintenance impacts on estuarine and marine species, their habitats, and ocean users (including the potential loss of fishing opportunities and/or the displacement of commercial and recreational fishermen), which will be minimized by appropriate construction and maintenance techniques and work windows described in the Certificate Conditions;

d. temporary construction impacts to water quality, wetlands and waterbodies, terrestrial habitats, and wildlife, which will be minimized by following the applicable construction techniques described in the Certificate Conditions;

e. selective clearing of vegetation at the OnCS–DC and Holbrook Substation and minimal vegetation clearing along the Onshore Transmission Cable corridor; because the entire Onshore Transmission Corridor will be located within existing disturbed right-of-way to the extent practicable, the amount of clearing is far more limited than it would be if new corridors were being created; and

f. temporary disturbance and inconvenience, including noise and debris, associated with construction activities.

6. Based upon the information provided in Evidentiary Record Exhibits 1, 3, 4, 5, 6, 7, 11, 12, 14, 15, 16, 20, 22, 23, and 24, the Project minimizes to the extent practicable any significant adverse environmental impact and minimizes to the extent practicable any significant adverse impact on active farming operations, considering the state of available technology and the nature and economics of the various alternatives and other pertinent considerations. By utilizing existing transportation corridors to the maximum extent practicable, the effect of the Project on agricultural lands, wetlands, and other

environmental resources is minimized. As required by ECL § 57-0123 (3) (a) and based upon the information provided in the same exhibits referenced above, the Commission finds that the 2.4-mile segment of the Project that traverses the Central Pine Barrens' Compatible Growth Area conforms with the Central Pine Barrens Comprehensive Land Use Plan.

7. Based upon the information provided in Evidentiary Record Exhibit 8, the location of the Project will conform to the substantive provisions of the applicable local laws and regulations issued thereunder, except those local laws and regulations which the Commission refuses to apply, with the support of the Town of Brookhaven and County of Suffolk (Evidentiary Record Exhibit 21), because the Commission finds, based on the justifications set forth in Evidentiary Record Exhibits 8, that as applied to the Project, such are unreasonably restrictive in view of the existing technology, or of factors of cost or economics, or of the needs of consumers whether located inside or outside of such municipality.

8. No above-ground component of the Project will be located in a Potential Environmental Justice Area as defined in the NYSDEC Commission Policy 29; therefore, the Project will have no permanent impact in those areas.

9. Based on the entire Evidentiary Record as listed on Appendix A, the Project will serve the public interest, convenience, and necessity.

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APPENDIX D

PROPOSED CERTIFICATE CONDITIONS

Case 20-T-0617

Sunrise Wind LLC

PROPOSED CERTIFICATE CONDITIONS

The Commission orders:

A. Conditions of the Order

1. Subject to the conditions set forth in this Opinion and Order, Sunrise Wind LLC (Certificate Holder) is granted a Certificate of Environmental Compatibility and Public Need (Certificate) pursuant to Article VII of the Public Service Law (PSL) authorizing the construction and operation of an underground electric transmission system consisting of: (i) one high-voltage direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 5.2 miles (mi) (8.4 kilometers [km]) in length in New York State (NYS) waters and up to 1,054 feet (ft) (321 meters [m]) located onshore (i.e., above the Mean High Water Line [MHWL], as defined by the United States [US] Army Corps of Engineers [USACE] [33 Code Federal Regulations (CFR) 329]) and underground, up to the transition joint bay (TJB) (the SRWEC–NYS); (ii) a DC underground transmission circuit (320 kV) up to 17.5 mi (28.2 km) in length primarily within existing roadway rights-of-way (ROW) and concrete and/or direct buried splice vaults and associated components (the Onshore Transmission Cable); (iii) an onshore converter station that will transform the project's voltage from 320 kV to 138 kV alternating current (AC) (the OnCS–DC); (iv) two AC underground circuits (138 kV) approximately 1.1 mi (1.7 km) in length, which will connect the new OnCS–DC to the existing Holbrook Substation (the Onshore Interconnection Cable); (v) fiber optic cables co-located with both the Onshore Transmission Cable and Onshore Interconnection Cable; (vi) laydown yards; and (vii) the expansion of the Holbrook Substation to accept the Onshore Interconnection Cable (the Holbrook Substation Expansion). The SRWEC–NYS, Onshore Transmission Cable, OnCS–DC, Onshore Interconnection Cable, fiber optic cables, laydown yards, and the Holbrook Substation Expansion shall collectively be referred to herein as the "Project." The transition of the SRWEC–NYS to the Onshore Transmission Cable will occur where the cables are spliced together at the TJB and link boxes located at the work area within Smith Point County Park on Fire Island in the Town of Brookhaven (the Town) (the Landfall Work Area).

2. For purposes of the Certificate Conditions, "Project Corridor" shall be defined as the area in which Certificate Holder is authorized to construct, operate, maintain, repair, and decommission the Project, including any temporary laydown yards and work areas. The Project shall be located within the Project Corridor, which is shown on the maps included in Appendix B to the Joint Proposal. The Certificate Holder shall confine construction, operation, maintenance, repair, and decommissioning activities to the Project Corridor. The SRWEC–

NYS route may deviate from where it is shown within the Project Corridor maps included in Appendix B but the Project Corridor may not be expanded without amending the Certificate.

3. The Certificate and these Certificate Conditions shall apply only to the Project, which is wholly located within the jurisdictional boundaries of the State of New York.

4. The Certificate Holder shall, within 30 days after the issuance of the Certificate, file with the Secretary (the Secretary) of the Public Service Commission (the Commission) either a petition for rehearing or a verified statement that it accepts and will comply with the Certificate. Failure to comply with this condition shall invalidate the Certificate.

5. The Certificate Holder shall notify the Secretary in writing should it decide not to complete construction of all or any portion of the Project within 30 days of reaching such a decision and shall serve a copy of such notice upon all parties to this proceeding (the Proceeding).

6. The Certificate Holder shall construct the Project in accordance with this Certificate, the approved Environmental Management and Construction Plan (EM&CP), which may be approved in phases (each, a "Phase"), and any subsequent Commission order.

7. The Certificate Holder shall further detail the construction and monitoring plans within the Project Corridor in the EM&CP. The Project's EM&CP will have an initial phase (Phase 1) and a subsequent phase(s) (any, Post-Phase 1). The portions of the Project that will be included in the Phase 1 EM&CP are described in Appendix G to the Joint Proposal.

8. For purposes of this Certificate, "Commencement of Construction" shall be defined as: the beginning of unlimited and continuous tree clearing, site clearing, ground disturbance, site preparation (except installation of temporary erosion and sedimentation control measures), and grading activities related to installation of the Project. Commencement of Construction does not include: (1) soil or groundwater testing, surveying (such as geotechnical drilling), or similar pre-construction activities undertaken to determine the adequacy of the Project Corridor for construction and the preparation of filings pursuant to the Certificate; and (2) other activities, such as limited staging and limited tree cutting required to perform such pre-construction activities.

    a. Certificate Holder will file any agreements or plans, including safety measures, it has entered into or agreed to with the Long Island Rail Road (LIRR) prior to the commencement of Post-Phase 1 construction.

    b. Prior to the preparation and use of each laydown yard, the Certificate Holder shall file with the Secretary appropriate Phase 1A and/or Phase 1B survey results, and documentation, if any is provided to Certificate Holder, of the SHPO determination of

no adverse effect, or a copy of an executed mitigation agreement between the Certificate Holder and SHPO, if adverse effects cannot be avoided.

9. The Commencement of Construction shall not begin for any portion of the Project before the Commission has approved the applicable Phase of the EM&CP.

10. If the Commencement of Construction of the Project does not begin within the later of 18 months after the Commission approves the EM&CP or Certificate Holder receives all applicable federal permits and approvals, the Certificate may be vacated by the Commission with notice to the Certificate Holder and all parties. The Certificate Holder shall be excused from this requirement during the length of any force majeure event and may request an extension of this deadline. Any request for an extension must be in writing, include a justification for the extension, and be filed with the Secretary at least one day prior to the affected deadline.

B. Laws and Regulations

11. Each substantive federal, State, and local law, regulation, code, and ordinance applicable to the Project shall apply, except to the extent that the Commission has expressly refused to apply any substantive local law or regulation as being unreasonably restrictive.

12. No State or local legal provision purporting to require any approval, consent, permit, certificate, or other condition for the construction or operation of the Project authorized by the Certificate shall apply, except: (i) those of the PSL, including but not limited to Sections 68, 69, and 70, and regulations and orders adopted thereunder; (ii) those provided by otherwise applicable State law for the protection of employees engaged in the construction and operation of the facilities; and (iii) those permits issued under a federally-delegated or pursuant to federally-approved environmental permitting program, or federal consistency review pursuant to the federal Coastal Zone Management Act.

13. The Certificate Holder shall construct the Project in a manner that conforms to all applicable national and international electrical standards. Upon completion of the Project, the Certificate Holder shall file a letter with the Secretary certifying that the Project was constructed in full conformance with the National Electric Safety Code (NESC).

14. Nothing herein shall preclude the Certificate Holder from voluntarily subjecting itself to applicable State or local approval, consent, permit, certificate, or other condition for the construction or operation of the Project, subject to the Commission's ongoing jurisdiction.

15. The Certificate Holder shall apply for a New York State Department of Transportation (NYSDOT) highway work permit (Highway Work Permit) and use and occupancy agreement pursuant to Title 17 of New York Codes, Rules, and Regulations (NYCRR) Parts 126, 127 and 131 and NYS Highway Law Section 52 for construction and operation of any portion of the Onshore Transmission Cable in NYSDOT-owned ROW, subject to the Commission's ongoing jurisdiction.

16. The Certificate Holder shall not commence work on any Phase until it obtains all required interests in real estate, including interests in real estate to be used for access roads (whether obtained through a conveyance, consent, permit, or other approval) as are necessary and applicable for such Phase. Confirmation of obtaining such interests shall be provided to the Secretary prior to commencement of the work. The Certificate Holder acknowledges that, consistent with Certificate Condition 12, it will secure any necessary approvals under PSL Section 68 before commencement of any such work.

17. The Certificate Holder shall not commence Phase 1 work prior to the State's approval of parkland alienation necessary to construct the entire Project, which includes land at the Smith Point County Park and Southaven County Park, and any necessary Federal Highway Administration approval and any other permit or approval necessary for construction in those areas unless otherwise described below.

    a. The Certificate Holder currently anticipates that the Phase 1 EM&CP will be followed by a limited notice to proceed that authorizes all Phase 1 work to proceed immediately upon approval aside from installation of the: (1) Equipment (described below in Certificate Conditions 75 [d] and 81), which will not be allowed to proceed until the issuance of the: (i) Construction and Operations Plan (COP) approval by the Bureau of Ocean Energy Management, (ii) the Individual Permit issued by the United States Army Corps of Engineers (the Corps Permit), and (iii) National Park Service special use permit.

18. The Certificate Holder shall not commence Post-Phase 1 work prior to the issuance of the: (i) COP approval; (ii) the Corps Permit; (iii) appropriate Work Permit by the New York State Office of General Services; and (iv) remaining permits necessary to place the transmission cable (*i.e.*, an appropriate EM&CP approval by the Commission and National Park Service special use permit). The Certificate Holders shall provide copies of said permits to the Secretary within fifteen days of receipt. In no event shall a delay or failure to obtain any of the above-referenced approvals serve as an occasion or justification for a deferral or alteration of any and all required site clean-up and restoration activities as set forth in the applicable EM&CP and relevant sections of this Certificate.

19. To the extent required in connection with the delivery of oversized components, supplies, or equipment for the Project, the Certificate Holder or its suppliers shall obtain any required permits from applicable State or local agencies, including NYSDOT, subject to Condition 14 hereof and to the ongoing jurisdiction of the Commission. Oversized delivery of cable and other materials for the Project will occur in accordance with traffic controls specified in the EM&CP to minimize, to the extent practical, disruption of traffic and be coordinated with the DOT to the extent the delivery will occur on or impact a DOT roadway. In addition, the Certificate Holder will provide New York State Department of Public Service Staff (DPS Staff or DPS) and DOT, and, as applicable, the Town, with at least one-week advanced notice of each oversized delivery that will require a road closure, in compliance with the Maintenance and Protection of Traffic Plan.

20. To the extent a disagreement arises regarding the implementation of the Joint Proposal and any of its provisions that cannot be informally resolved by the Signatory Parties: (a) the Signatory Parties shall promptly convene a telephone conference, and in good faith attempt to resolve any such disagreement; and (b) if any such disagreement cannot be resolved by the Signatory Parties, any Signatory Party may petition the Commission for resolution of the disputed matter. The Certificate Holder shall use best efforts to select a mutually agreeable date for such a telephone conference, and shall file a notice with the Secretary or otherwise take reasonable steps to provide notice to the Signatory Parties that is timely under the circumstances.

C. Public Health and Safety

21. The Certificate Holder shall design, engineer, and construct the Project such that its operation shall comply with the electric and magnetic field (EMF) guidelines and standards established by the Commission in Opinion No. 78-13, issued June 19, 1978, and the Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities, issued September 11, 1990, or the Commission's most recent electric and magnetic field guidelines and standards in effect at the time the Commission grants the Certificate.

22. The Certificate Holder will conduct post-construction bathymetric measurements of the SWREC-NYS's location and burial depth. Those measurements will, in turn, be analyzed with the SRWEC-NYS's as-built installation plan and profile drawings and maps to report deviations that could potentially cause the cables to exceed stated ratings (*i.e.*, to carry long-term currents greater than stated in the Appendix 4-J to the Application). Any such deviations shall be memorialized and summarized in a report that includes a detailed impact assessment, including an evaluation as to whether any deviations would pose a hazard to public safety, adverse impact to marine navigation, or is demonstrated to adversely impact marine species (the Post-Construction EMF Report). The Post-Construction EMF Report will be filed with the Secretary within four months of the availability of the aforementioned information.

23. In addition to the above post-construction review described in Condition 22, the Certificate Holder also will file with the Secretary a summary of the results of the first six-months of monitoring of the current flow on the SRWEC-NYS (the current flow on the onshore underground cables will be similar) following the Commercial Operation Date (COD). That monitoring is stated to include logging of DC cable primary values (DC power flow) and will establish the relationship between EMF level and wind farm output. In addition, periodic measurements of AC frequencies up to 3 kilohertz (kHz) will be manually recorded monthly during this period by the Transient Fault Recorder (part of the HVDC Control and Protection system). Further, based upon the as-built configurations and recorded current flows the Certificate Holder will file with the Secretary an assessment of the static (DC) magnetic field produced by the SRWEC-NYS during the first six months of commercial operation at 1 meter (3.28 ft) above the seabed and at horizontal distances of 10, 50, 150, and 200 ft from representative locations (tabular and graphical representations of mG difference from above ambient levels of the geomagnetic field along transects oriented perpendicular to the cable center line). These representative locations will describe the range of burial depths and cable configurations measured in the bathymetric survey. They will further cover the range of current levels recorded during the first 6 months of monitoring. This EMF Verification Assessment will validate the Certificate Holder's model by comparing the calculated levels of magnetic fields and induced electric fields submitted in the Application to the levels of these fields determined from the as-built operational data gathered above. A general summary and evaluation of the magnitude and potential significance of any recorded AC currents will also be part of this assessment. The EMF Verification Assessment will be submitted before the end of the first year of the Project's COD.

24. In addition, the Certificate Holder will submit measurements of the DC magnetic field taken 1 m above ground over a short, onshore section of SRWEC-NYS and at horizontal distances of 10, 50, 150, and 200 ft, if possible, from representative locations within this area. These onshore measurements will be performed in general accordance with applicable standards (e.g., IEEE Std. C95.3-2022) before and after energization of the cable to confirm that the magnitudes of the calculated DC magnetic fields at that location, based upon as-built specifications and recorded DC current flow, are an accurate predictor of the measured DC magnetic field consistent with the limits of the combined measurement accuracy and measurement variation. The measurements will be included in the EMF Verification Assessment. In addition, the Certificate Holder will take measurements with a magnetometer to capture the DC magnetic field taken above representative offshore segments of the SRWEC-NYS and included in the EMF Verification Assessment (Condition 23). Measurements will include the total magnetic field (earth + cable) at horizontal distances of 10, 50, 150, and 200 ft from representative segments (if accessible). Based upon the as-built drawings (as described in Condition 23), representative segments will include configurations of the SRWEC-NYS at varying burial depths and cable configurations (side-by-side and top-over-bottom) and a

mattress-covered segment (if any). If as-built drawings (as described in Condition 23) show that one configuration is not present for a sufficient extent (*e.g.*, at least 100 meters), two measurements over the dominant configuration will be performed.

25. As detailed in Conditions 140, 141, 142, and 146, the Certificate Holder has prepared a Fisheries Monitoring Plan (Appendix N) and Benthic Sampling Plan (Appendix O) that will, in part, assess the potential impacts associated with the operation of the SRWEC-NYS on the behaviors and migratory patterns of commercially and ecologically important species in coastal waters south of Long Island. Because the as-built configurations and recording of operational current levels on the SRWEC-NYS will allow accurate evaluation of magnetic and induced electric field levels at any time, location, and distance from the installed SRWEC-NYS, the Certificate Holder will provide the EMF levels obtained for specific locations, days, and time of operation in conjunction with the above-referenced study to the researchers conducting the monitoring under the Fisheries Monitoring Plan and Benthic Sampling Plan.

26. If environmental or engineering constraints require siting of the Onshore Transmission Cable within one hundred (100) feet of a known existing, active drinking water supply well, the Certificate Holder shall perform pre- and post-construction water turbidity testing, provided the Certificate Holder is granted access by the property owner. The results of such tests and reports shall be made available to the parties upon request.

    a. Should New York State Department of Health (NYSDOH)-certified laboratory testing conclude that the water turbidity from an existing, active drinking water supply well was less than the New York State standard of 5 Nephelometric Turbidity Units for drinking water prior to construction, but failed to meet such standards post-construction, the Certificate Holder shall cause a new water well to be constructed, in consultation with the property owner, at least one hundred (100) feet from the Onshore Transmission Cable, as practicable given siting constraints and landowner preferences. Such protocols will be included as part of any applicable EM&CP.

27. The Certificate Holder shall engineer and construct the Project to be fully compatible with the operation and maintenance of any nearby electric, gas, telecommunication, water, sewer, and related facilities. Site plans and profiles of the EM&CP shall include existing underground utility or non-utility structures including but not limited to gas, water, telecommunication or electric cable or pipeline, to the extent known, and will identify the relationship of the Facility to adjacent fence lines; roads; railways; airfields; property lines; hedgerows; fresh surface waters; wetlands; other water bodies; significant habitats; associated facilities; water springs; adjacent buildings; water wells; or structures; major antennas; oil or gas wells, pipeline facilities, and compressor and pressure-limiting and regulating stations. If required by existing utility owner/operator impacted by facility installation, copies of the following information

shall be provided in the EM&CP, prior to commencement of the activity (including but not limited to proposed facility crossings, co-locations, construction within existing easement, and machinery crossings) related to that utility's requirement:

a. Results of any cathodic protection impact studies;

b. Executed agreement, if any, with existing utility (including a statement that Facility installations meet existing utility owner technical and safety requirements and copies of all relevant technical and safety manuals);

c. Details of existing utility owner approved crossing plans (crossed by Project components) showing methods, separation of existing utility and Project components, cover, installation of protection measures, and workspace, including any bore pits or similar features;

d. Details of existing utility owner approved co-location installations (with Project components) showing separation distances of existing utilities and Project components and any required or protection measures; and

e. Details and descriptions of existing utility owner approved methods regarding Project construction equipment crossing of existing utilities approved by each existing utility owner.

28. The Certificate Holder shall keep local fire department and emergency management services apprised of the presence of on-site hazardous chemicals and waste. Procedures for the handling of any hazardous chemicals and waste are detailed in Section U below.

29. The Certificate Holder shall comply with the requirements for the protection of underground facilities set forth in 16 NYCRR Part 753 "Protection of Underground Facilities." The Certificate Holder shall require all contractors, excavators, and operators associated with its facilities to comply with all requirements of the Commission's regulations regarding identification and numbering of above ground utility poles (16 NYCRR Part 217). The Certificate Holder shall be responsible for contractually enforcing such compliance.

30. The Certificate Holder shall have the right to require that any person seeking to access the Project first be appropriately trained in environmental protection and worksite safety. The Certificate Holder will provide site inspectors and scheduled visitors with appropriate personal protective equipment for any tours of the Project. This may include a properly fitted, currently valid hardhat, safety glasses with side shields, high visibility vest, and steel or ceramic-toed

boots at any time while on site, unless the visitor is in a vehicle or in a construction trailer. The Certificate Holder may require site inspectors and scheduled visitors to comply with all safety and security requirements.

31. The Certificate Holder shall require its contractors or subcontractors to give an on-site tailboard safety briefing to site inspectors/visitors prior to any safety inspectors/visitors entering the Project site.

32. The Certificate Holder will provide periodic, or as needed, training sessions for the Town's Fire Department, and any other interested fire departments within Suffolk County (the County), to review the procedures and protocols necessary to safely respond to emergency events at the OnCS–DC and the Holbrook Substation. The Certificate Holder shall coordinate with PSEG Long Island (PSEG-LI) to ensure that such training includes procedures and protocols for emergency events at the existing facilities adjacent to the Interconnection Facility.

33. After final designs are submitted and buildings are identified for construction of the OnCS-NYS, the Uniform Fire Prevention and Building Code will apply and the Certificate Holder shall obtain review and written certification by a public entity recognized by the NYSDOS as having the requisite training or qualifications that the construction plans are in compliance with the Uniform Fire Prevention and Building Code.

34. The Certificate Holder shall use best efforts to avoid any thermal or capacity derating of any existing or proposed Long Island Power Authority ("LIPA") transmission and distribution cables along the entire route of the Project.

35. Any stop work order made in accordance with these Certificate Conditions will be complied with following completion of safety procedures and emergency protocols, unless operations must be continued to protect life, property, or the structural integrity of the ongoing construction.

D. Environmental Management and Construction Plan Process

36. The Certificate Holder shall follow the process and procedures described herein for each Phase of the EM&CP.

37. The Certificate Holder shall file a copy of the EM&CP with the Secretary for approval by the Commission. Contemporaneously with the submission and service of the EM&CP, Certificate Holder shall provide notice, in the manner specified below, that the EM&CP has been filed

(the EM&CP Filing Notice). In addition, the Certificate Holder shall provide copies of the EM&CP as follows:

a. Three hard copies and one electronic copy to the Secretary;

b. One electronic copy to: (i) the Commissioner of the New York State Office of Parks, Recreation and Historic Preservation (OPRHP); (ii) the Commissioner of the NYSDOT; (iii) the General Counsel of LIPA; (iv) the Secretary of State of the State of New York (NYSDOS); (v) the Commissioner of the New York State Department of Agriculture and Markets (NYSAGM), and (vi) the Commissioner of the New York State Department of Environmental Conservation (NYSDEC);

c. One electronic and one hard copy to the NYSDEC's Central Office in Albany;

d. One electronic copy to any other New York State agency (and its relevant regional offices) that requests the document;

e. One electronic copy to all parties on the service list for Case 20-T-0617; and

f. One hard copy for inspection by the public in at least one public library or other convenient location in each municipality in which construction will take place.

38. The Certificate Holder shall serve a copy of the EM&CP Filing Notice on all parties to the Proceeding and on the owners of property crossed by or abutting the impacted portion of the Project Corridor. Further, the Certificate Holder shall contemporaneously publish the EM&CP Filing Notice in a newspaper of general circulation in the vicinity of the Project and a free publication (if available) in the relevant vicinity of the Project.

39. The written EM&CP Filing Notice and the newspaper notice(s) shall contain, at a minimum, the following:

a. a statement that the EM&CP has been or will soon be filed;

b. a general description of the Project, the need for the Project, and of the proposed EM&CP;

c. a listing of the locations and website where the proposed EM&CP is available for public inspection;

d. a statement that any person desiring additional information about a specific geographical location or specific subject may request such information from the Certificate Holder;

e. the name, address, email, and toll-free telephone number of the Certificate Holder's representative;

f. the email and postal address of the Secretary and the URL for the DPS's Document Management and Matter system; and

g. a statement that any person may be heard by the Commission on any matter or objection regarding the proposed EM&CP by filing written comments with the Secretary within 45 days of the EM&CP filing date or within 45 days of the date of the newspaper notice, whichever is later. Comments on subsequent revisions to the EM&CP, in response to the aforementioned written comments, shall be permitted within 15 days of service by electronic means of said revisions.

40. The Certificate Holder shall submit to the Secretary a certificate of service with supporting affidavits indicating upon whom all EM&CP documents and EM&CP Filing Notice was served within three business days after the proposed EM&CP is filed. This submission shall be a condition precedent to approval of the EM&CP. When available, the Certificate Holder shall file with the Secretary proof of newspaper publication of a copy of the EM&CP Filing Notice.

41. The Certificate Holder shall follow the following procedures for any proposed change or modification to the EM&CP that has been approved by the Commission:

a. The Certificate Holder shall report any proposed changes to the EM&CP to DPS Staff. Any requested change or modification to the approved EM&CP that will not result in an increase in adverse environmental impacts or are not directly related to contested issues decided by the Administrative Law Judges (ALJs) or the Commission during the proceeding (minor change) will be decided, in writing, by the Chief and/or Director of Environmental Certification and Compliance Section (EC&C) of the Office of Electric, Gas and Water, or his or her designee. That decision will be filed with the Secretary's office. DPS Staff will refer all other proposed changes (major change) to the Commission for approval.

b. Upon being advised that DPS Staff will refer a proposed change to the Commission, the Certificate Holder shall provide electronic notice of the proposed change to all parties to the proceeding, as well as owners of all property owners that abut the right-

of-way, work areas, and all properties on which property rights are required. The notice shall: (1) describe the original conditions and the requested change; (2) state that documents supporting the request are available for inspection at specified locations; and (3) state that persons may comment by writing or calling (followed by written confirmation) to the Commission within 21 days of the notification date.

c. The Certificate Holder shall not execute any proposed change until the Certificate Holder has received the appropriate oral or written approval, except in emergency situations threatening personal injury, property, or severe adverse environmental impact. Any oral approval from DPS Staff will be followed by written approval from the Director of EC&C, their designee, or the Commission.

42. The Certificate Holder, where necessary, shall negotiate for additional temporary easements for construction purposes as identified in the EM&CP and approved by the Commission. Any temporary easement or construction areas not identified in the approved EM&CP may be requested through changes thereto in accordance with the process outlined in Condition 41.

E. Environmental Management and Construction Plan Contents

43. The Certificate Holder shall not commence site preparation or construction for any portion of the Project before it has submitted to the Commission and the Commission has approved the relevant phase of the EM&CP. Any phase of the EM&CP shall be organized and developed in a manner that is generally consistent with the Certificate and the Specifications for Development of EM&CP attached as Appendix E to the Joint Proposal. The Certificate Conditions and Appendix E shall be read together to describe the EM&CP's required contents. In addition, the Certificate Holder shall include the following details in the appropriate EM&CP:

a. The delineation of Project Corridor, as identified in Appendix B, and any temporary laydown yards and work areas to which Certificate Holder shall confine construction and subsequent maintenance activities, depicting property rights, clearing rights, access rights, and such other matters as appropriate to address the site and environmental conditions and property interests of affected landowners, and relevant conditions and requirements of the EM&CP. The delineation shall include the specific location and acreage of all needed real property or real property rights.

b. Details of street work, including provisions for minimizing the duration and extent of open excavation, traffic disruptions, and work within and adjoining public streets and ROW.

c. Drawings delineating the locations for existing and proposed access roads. Proposed access road improvements shall be indicated, including measures for environmental impact minimization and access control.

d. A Maintenance and Protection of Traffic Plan (MPT Plan) for all roadways directly affected by construction activities prepared in conformance with the National Manual on Uniform Traffic Control Devices (MUTCD) and New York State Supplement. The Certificate Holder shall consult with traversed school districts prior to the commencement of construction and the MPT Plan will reflect the outcomes of those consultations, including any measures taken with respect to school bus routes.

e. The information necessary to respond to the requirements of 17 NYCRR Part 131, entitled Accommodation of Utilities Within State Highway Right-of-Way, applicable design standards of the American Association of State Highway and Transportation Officials ("AASHTO"), the Highway Design Manual, the Policy and Standards for Entrances to State Highways, the Requirements for the Design and Construction of Underground Utility Installations within the State Highway ROW and the Accommodation Plan, including the provision of NYSDOT Standard Details and Standard Item Numbers.

f. The Certificate Holder shall include consultation results between itself, the NYSDOT, and the Suffolk County Department of Public Works (DPW) regarding construction work near the existing William Floyd Bridge in the post-Phase 1 EM&CP. This report shall identify the responsible party and include details of any required site restoration, mitigation measures and/or restrictions, if any, associated with this work.

g. A plan for access to construct the Project in the NYSDOT-owned highway ROW clearly defining all access locations and rights and a plan for access to the Project on the NYSDOT-owned highway ROW for operation and maintenance including an MPT Plan in conformance with MUTCD and New York State Supplement.

h. A plan for access to construct the Project in parkland and open space areas and associated municipally owned parking areas clearly defining all access locations and rights and a plan for future access to the Project. The EM&CP should demonstrate that access to the Project will not hinder use of recreational areas nor reduce existing parking areas below what is needed to accommodate seasonal use.

i. A Material Management Plan that will outline the process and procedures for the handling of any contaminants or hazardous waste encountered during construction.

i. For any excavated material not used as backfill, the final material disposal location must be submitted to DPS Staff, the Town, and NYSDEC at least 30 days prior to disposal. Disposal of all material must comply with 6 NYCRR Part 360 et seq.

ii. If contamination in the ground is detected during construction of the Facility, and such contamination is of the kind that will lead to volatilization or off-gassing of such contamination or chemical constituents thereof, the Certificate Holder shall contact NYSDOH, NYSDEC, and DPS Staff prior to further disturbance. Additionally, the Certificate Holder shall conform to practices and procedures described in the DER-10/Technical Guidance for Site Investigation and Remediation and the NYSDOH Generic Community Air Monitoring Plan ("CAMP"), to the extent applicable.

j. Locations, dimensions, and installation methods to be used for the installation of the Project's concrete and/or direct buried splice vaults.

44. During the preparation of the EM&CP and again prior to Commencement of Construction if the Commencement of Construction is more than one year after receipt of the updates obtained to draft the EM&CP, the Certificate Holder shall contact NYSDEC, NYS Natural Heritage Program, NYSDOS, and United States Fish and Wildlife Service (USFWS) and review publicly available information from National Marine Fisheries Service (NOAA Fisheries) to check for any updates or changes of known threatened or endangered (T&E) species or habitat, NYS Significant Coastal Fish and Wildlife Habitats, and Significant Natural Communities in the Project Corridor. Resulting notifications will be handled in accordance with Condition 75 (e).

45. Prior to the approval of any applicable EM&CP, the Certificate Holder shall file with the Secretary upon receipt: the Stormwater Pollution Prevention Plan (SWPPP), Municipal Separate Storm Sewer (MS4) approval(s), five-acre waiver (if necessary), and NYSDEC's letter of acknowledgement of the Notice of Intent for coverage under the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (the SPDES General Permit). The Certificate Holder shall develop the EM&CP in accordance with the SWPPP requirements in the SPDES General Permit in effect at the time of the filing of the EM&CP. Notwithstanding the foregoing, if any necessary MS4 approval has not been obtained by the Certificate Holder prior to the EM&CP being filed with the Secretary, the Certificate Holder shall file a draft SWPPP at the time it files the EM&CP with the Secretary. If any of the aforementioned documents require modification of the EM&CP, such modifications shall be filed with the Secretary prior to EM&CP approval.

46. The Certificate Holder shall include a Lighting Plan as part of the Phase 1 EM&CP, which shall include the following guidelines for lighting to be used on the Project:

a. Security lighting needs at the OnCS–DC and any exterior equipment storage yards.

b. Plan and profile figures to demonstrate the lighting area needs and proposed lighting arrangement at the OnCS–DC and any exterior equipment storage yards.

c. A specification that lighting should be designed to provide safe working conditions at appropriate locations.

d. A specification that exterior lighting design shall be specified to minimize, to the extent possible, off-site lighting effects, by:

i. using task lighting only as needed and as appropriate to perform specific installation, maintenance, repair, or emergency-response tasks; task lighting shall be designed to be capable of manual or auto-shut off switch activation rather than motion detection; and

ii. requiring full cutoff fixtures, with no drop-down optical elements (that can spread illumination and create glare) for permanent exterior security lighting.

e. manufacturer's cut sheets of all proposed lighting fixtures shall be provided.

47. The Certificate Holder shall file as part of the EM&CP concerning construction of the OnCS–DC, details of proposed noise control features and design requirements of the OnCS–DC site (OnCS–DC Site) to achieve design goals, including prominent tone effects, at noise-sensitive receptor location, and the following:

a. Final drawings for the OnCS–DC Site, incorporating any changes to the design, including:

i. Location of all noise sources and receptors identified with Geographic Information Systems (GIS) coordinates in tabular format and GIS digital files;

ii. Proposed grading and noise source heights and ground elevations; Site plan and elevation details of the OnCS–DC Site components as related to the location of all relevant noise sources (e.g. transformers, reactors, filters, HVAC and HVDC equipment, and emergency generators, if any);

iii. Identified mitigations, specifications, and appropriate clearances (e.g., sound walls, barriers, enclosures, converter hall building walls, low-noise fans); and

iv. Sound information from the manufacturers for all noise sources (e.g. transformers, reactors, HVAC and HVDC equipment, emergency generators, if any).

b. Revised sound modeling with the final specifications of equipment selected for construction to demonstrate that the OnCS–DC Site is modeled to meet the sound goals and limits for residences, commercial and industrial properties existing as of the date the Order is issued as noted in Certificate Condition 49.

48. Noise levels from all noise sources within the OnCS–DC Site at any operational conditions shall:

a. Comply with a noise limit of 42 dBA Leq (1-hour) maximum equivalent continuous average sound level at the outside of any non-participating residence. Emergencies are exempt.

b. Should a prominent tone be expected to occur (from the final design before construction), or occur (during operation, after construction), at any non-participating residential position, the broadband overall (dBA) noise level at the evaluated position shall be increased by 5 dBA for evaluation of compliance with the maximum noise limit indicate in Certificate Condition 48 (i).

c. 45 dBA Leq-1-hour maximum equivalent sound level from the OnCS–DC Site across any portion of non-participating residential properties, except for delineated wetlands and utility rights of way. This shall be demonstrated with modeled sound contours and discrete sound levels at worst-case locations. No penalties for prominent tones will be added in the evaluation of this limit.

d. The Leq-1-hour maximum A-weighted ambient sound level from the OnCS–DC Site, will not exceed the maximum permissible sound pressure levels as specified by the Town's Code, Chapter 50, for industrial and commercial properties. This shall be demonstrated with modeled sound contours and discrete sound levels at worst-case locations. No penalties for prominent tones will be added in the evaluation of this limit.

e. Final pre-construction computer noise modeling and tonality evaluation shall be

conducted in accordance with the Specifications for Computer Noise Modeling and Tonal Evaluation, Appendix L.

49. To evaluate compliance with noise-related conditions after construction, during operation, the Certificate Holder shall comply with the following requirements:

    a. The OnCS–DC Site shall be evaluated by the Certificate Holder by following the provisions and procedures for post-construction noise performance evaluations included in the Sound Testing Compliance Protocol (STCP), Appendix M, after the commercial operation date of the OnCS–DC Site.

    b. Within seven (7) months after the commercial operation date of the OnCS–DC Site, the Certificate Holder shall perform and complete at least one sound compliance test and the results shall be submitted by filing with the Commission a report from an independent acoustical or noise consultant, no later than eight (8) months after the commercial operation date, specifying whether or not the OnCS–DC Site is found in compliance with all certificate conditions regarding noise.

50. If the results of the post-construction sound compliance test, or any subsequent test, or any compliance or violation test, indicate that the OnCS–DC Site does not comply with certificate conditions on noise, the Certificate Holder shall:

    a. Present noise minimization options to the Commission (e.g. sound barriers, enclosures, replacement or maintenance of noisy components, silencers, low-noise fans, any other mitigation measures as feasible and appropriate), within 60 days after the filing of a non-compliance test result or the finding of a noncompliance or a violation of permit conditions on noise.

    b. Upon approval from the Commission, implement any noise minimization measures within 150 days after the finding of a non-compliance or violation, as necessary to achieve compliance.

    c. Operate the OnCS–DC Site with the minimization measures presented and approved by the Commission.

    d. Test, document, and present results to the Commission of any minimization measures implemented showing compliance with all conditions on noise, no later than 90 days after the minimization measures are implemented.

51. The EM&CP shall identify any water withdrawal activities that the Certificate Holder anticipates will be regulated pursuant to 6 NYCRR §§ 601.3 and 601.6, including dewatering directly from the excavation not meeting the exemption criteria pursuant to 6 NYCRR §§ 601.9 (o). The EM&CP shall also provide the information outlined in 6 NYCRR § 601.10 for any such activities. Prior to commencement of such activities, DPS Staff, in consultation with NYSDEC, will determine whether to recommend that the Commission impose any conditions or restrictions on such activities. Such determination will be based on the substantive portions of the following regulations: 6 NYCRR §§ 601.11, 601.12, 601.16, 601.19, and 601.20.

52. The EM&CP shall identify the property locations, if any, where the Certificate Holder anticipates that it will install one or more wells to conduct temporary or permanent dewatering activity for the Project at a total withdrawal capacity of such well or wells on any one property in excess of 45 gallons per minute (with capacity based on the capacity of the pumps to be installed, not on the contemplated draft). The EM&CP shall also provide the substantive information outlined in 6 NYCRR 602.3 (c)-(d) for any such activities. Prior to commencement of such activities, DPS Staff, in consultation with NYSDEC, will determine whether to recommend that the Commission impose any conditions or restrictions on such activities. Such determination will be based on the standards of issuance in Environmental Conservation Law (ECL) 15-1527 (4).

53. Certificate Holder shall provide a Dewatering Plan at least 45 days prior to filing each applicable EM&CP to DPS Staff, DOS, NYSDOT, and NYSDEC for review and comment. The Dewatering Plan shall be filed with the EM&CP and include:

    a. locations where dewatering will be required, including the anticipated depth of groundwater and the installation depth of the cable and vaults at those locations;

    b. method of dewatering, including the number and depth of the well points (if applicable);

    c. pump capacity, rate, and estimated daily pumpage and duration of dewatering for each location requiring dewatering, or, if not available at the time of the circulation of the Dewatering Plan, typical specifications that will be followed during final selection of equipment unless otherwise agreed upon by DPS Staff and NYSDEC;

    d. if uncontaminated water from dewatering operations will be discharged to groundwater or surface water, the Dewatering Plan shall include the following:

        i. a map showing proposed discharge location points;

ii. if discharging to a storm drain or recharge basin, verification that these systems are designed to handle the proposed rate for the duration of the discharge and the substantive requirements for all State, county, and town approvals are being met for such discharges;

iii. if discharging to a storm drain, identify the ultimate surface water outfall location;

iv. if discharging to an existing recharge basin or creating a new recharge basin, evaluation of mounding effects to ensure that mounding does not adversely affect any surrounding properties and underground structures; and

v. best management practices to prevent erosion and sedimentation from dewatering operations.

e. maps of areas requiring dewatering with wells (if applicable);

f. maps of areas requiring dewatering within or adjacent to the NY Central Pine Barrens and within or adjacent to the Carmans River One-Hundred-Year Groundwater Contributing Area;

g. verification that dewatering operations conducted using wells are carried out by a well driller duly registered in accordance with ECL § 15-1525;

h. effluent limits provided by NYSDEC based on applicable regulations, standards, criteria, and guidance values;

i. treatment and disposal plan for contaminated water generated from the dewatering operations;

j. sampling plan that will be followed during dewatering operations of influent and effluent; and

k. sampling plan that will be followed in the event dewatering is required in locations that were not anticipated.

l. NYSDOT shall have the right to terminate or restrict discharge flow conveyed into the NYSDOT drainage system during and after storm event to prevent overburdening of the NYSDOT drainage system.

54. The Certificate Holder shall submit the following information to NYSDOT for review and approval prior to any proposed discharge into the NYSDOT drainage system:

    a. method of conveyance;

    b. discharge flow rate;

    c. duration of discharge; and

    d. water sampling.

55. The Certificate Holder shall prepare a detailed Onshore Soil Handling and Erosion Control Plan to be included in any applicable EM&CP. The Onshore Soil Handling and Erosion Control Plan shall include specifications for testing, stockpiling, reuse or removal from site, storage, erosion control, restoration, and compaction of backfill in trenches. Such plan shall be consistent with the acknowledged SPDES General Permit and SWPPP.

56. The applicable EM&CP shall address and/or include, but not be limited to, the following information:

    a. a construction schedule detailing work activities and allowable work windows, which shall be provided to DPS Staff, NYSAGM, NYSDEC, NYSDOT, NYSDOS, and the Town at least 45 days prior to filing the EM&CP for review and comment;

    b. a Horizontal Directional Drill (HDD) work plan providing planning, feasibility analysis, installation controls, and site measures (including excavation and backfill of the HDD exit) that will be taken in accordance with good engineering practices that will be consistent with Appendix H of the Joint Proposal, HDD Work Plan Scope of Study;

    c. the locations of any HDD entry and exit shall be detailed in the EM&CP;

    d. cable burial techniques and adjustments along the SRWEC–NYS, including a detailed graphical representation of anticipated minimum and maximum achievable burial depths based on sediment conditions (e.g., sediment densities, shear strengths, and other limiting factors) at 100-foot intervals; written evaluation of the likelihood of achieving target burial depths based on the results of the study; and a quantitative analysis of risks to the cable and coastal users along the SRWEC-NYS. The Certificate

Holder shall provide this information to DPS Staff, NYSDEC, NYSDOS, and LICFA at least 30 days prior to filing the EM&CP for review and comment;

e. written evaluation of the efficacy of alternative cable protection measures that may be required along the SRWEC-NYS and justification for why the selected cable protection method is preferred at each site. The analysis shall: (i) include, to the extent available, technical documentation from cable protection manufacturers; and (ii) evaluate a range of cable protection measures (e.g., concrete mattresses with taper edges, self-burying, crushed rock, and rock bags or other appropriate protection method(s)) with respect to their ability to maintain overtrawlability, minimize shifting over time, and avoid creating a discernable berm on the seafloor.

f. a work plan for dredging activities, including specific practices to be used during dredging; specifications of any dredging equipment; and purpose; any temporary protection and/or additional excavation that may be needed if HDD activities occur across multiple work windows; and proof of the ability to provide proper disposal of excavated material not used as natural backfill, which shall be provided to DPS Staff, NYSAGM, NYSDEC, and NYSDOS at least 45 days prior to filing the EM&CP for review and comment;

g. a Suspended Sediment and Water Quality Monitoring Plan, which shall be provided to DPS Staff, NYSDEC, and NYSDOS, at least 45 days prior to filing the EM&CP for review and comment and will be consistent with Appendix I of the Joint Proposal, Suspended Sediment and Water Quality Plan Scope of Study, for cable burial activities;

h. details of cable pulling and splicing plans including details associated with installation of spare conduits along the Onshore Transmission Cable route. The splicing plan shall be provided to DPS Staff, NYSDEC, and NYSDOS at least 45 days prior to filing the EM&CP for review and comment; and

i. details on the area and duration of any temporary in-water closures needed during HDD and cable laying activities; how these areas have been minimized; details on how mariners, including commercial, recreational, and for-hire (charter) fishermen and other recreational boaters, will be alerted to the presence of the in-water work area, including any Private Aids to Navigation (PATON) that may be required in State waters; and identification of activities that will be the subject of United States Coast Guard's (USCG) Local Notice to Mariners.

57. A detailed Highway Work Plan governing activities within highway rights-of-way, prepared in coordination with the Town Highway Department, NYSDOT, and DPS Staff, and in

compliance with 17 NYCRR Part 131, shall be included in each applicable EM&CP, and shall cover at a minimum:

a. a schedule showing the sequence and duration of trenching, backfilling, drilling and/or pipejacking, cable delivery (per Condition 110) and pulling, splicing, and testing;

b. a traffic diversion/lane closure plan, as described in Condition 43 (d), which shall identify procedures to be used to maintain traffic and provide a safe construction zone for those activities within the roadway ROW. The plan shall also describe temporary signage, lane closures, placement of temporary barriers and traffic diversion. Flaggers shall always be present when equipment is crossing any road when equipment is being loaded or unloaded, and where two-lane traffic has been reduced to one lane;

c. coordination with planned highway and bridge construction and repair projects, as described in Condition 43 (f), and repair projects;

d. a map showing the location of: the trench with reference to the paved highway surface, lay down and mobilization areas, drilling and HDD exit, pipejacking entry and exit, and splicing locations;

e. trench profile;

f. a plan for trench backfilling, marking and protection, and temporary covering;

g. a plan for trenching and cable laying in the vicinity of other underground utility lines, conduits and pipes;

h. a Soil Handling and Erosion Control Plan, including a plan for the handling of any contaminated materials (as described in Condition 55);

i. a Vegetation Management Plan, that includes, a post-completion assessment of the need for remedial vegetation plantings (as described in Section V);

j. a plan for minimizing construction-related noise during the hours between 7:00 p.m. and 7:00 a.m., pursuant to Conditions 76 and 77;

k. a plan for minimizing construction-related lighting impacts on surrounding areas (as described in Condition 46); and

l. a plan for minimizing disruption of traffic, pedestrian and recreational use (as described in Condition 58).

58. Unless otherwise approved by the NYSDOT, Certificate Holder agrees to abide by the following traffic restrictions in NYSDOT-owned highway rights-of-way, which will be incorporated into each applicable EM&CP:

a. No lane closures will be permitted on the South Service Road if there is a closure on the impacted portion of the eastbound side of the Long Island Expressway. Traffic shall be shifted as necessary to maintain at least one (1) 12-foot lane in each direction.

b. Unless otherwise permitted by the NYSDOT issued Highway Work Permit, no lane shifts will be allowed on weekends and on the following days:

i. from noon on the Friday before Memorial Day through Labor Day;

ii. Veterans Day;

iii. from noon the day before Thanksgiving Day through the Sunday following Thanksgiving Day;

iv. the day before Christmas and Christmas Day; and

v. the day before New Year's and New Year's Day.

c. At all other locations, lane shifts will be permitted between 10:00 AM and 3:00 PM.

d. Prior to nighttime operations and whenever there is on-street parking within the work zone, the Certificate Holder shall post signs spaced every 200 feet through the work zone that state: "No parking 10:00 PM to 6:00 AM." The Certificate Holder shall also distribute flyers to all businesses and residents along the work zone at least 72 hours before the implementation of the parking restrictions. Existing parking signs within the work zone, which are conflicting with the nighttime construction parking restrictions, shall be covered completely with an opaque material, as ordered by the engineer (A.O.B.E).

e. The Certificate Holder shall not work on both sides of the roadway in the same area at the same time.

f. The Certificate Holder shall notify the Town engineer, the Suffolk County Highway Department, the Suffolk County Police Department, the Town of Brookhaven Police Department, DPS Staff, and the NYSDOT Inform Center at least 7 calendar days prior to all detours, proposed street closings, or any other work that might affect the mobility

or access of emergency vehicles. In addition, the Certificate Holder shall ensure that hydrants and alarm boxes are kept clear and available.

g. The Certificate Holder shall schedule its operations to minimize the interruption of pedestrian traffic. The sidewalk on one side of the roadway shall remain open and passable when practicable. During the reconstruction of sidewalks, pedestrian safety and property access must always be maintained to the satisfaction of the engineer. The Certificate Holder shall place all underground appurtenances under the sidewalk first.

59. The Certificate Holder shall use best efforts to coordinate its construction schedule with the Brookhaven Public School District to ensure that such construction operations will not interfere with the district's start and dismissal times and bussing schedules.

60. The Certificate Holder must submit a Fisheries Compensation Plan as part of the Post-Phase 1 EM&CP.

a. The Fisheries Compensation Plan shall include:

i. A narrative overview of the claim process, including summary of the initial decision making process;

1. That narrative will include more details on the Fishing Conflict Prevention/Hazard Notification Claim Procedure, which covers claims for:

a. commercial fisheries gear losses during all phases of the Project, including fisheries and benthic monitoring efforts, scientific study, survey, construction, operation, maintenance, and/or decommissioning for the life of the Project (up to 100% value of gear); and

b. a reimbursement process for any temporary displacement, or temporary impairment to fishing following gear loss, of commercial fishing directly resulting from the Project's fisheries and benthic monitoring efforts, scientific study, survey, construction and maintenance activities, including any necessary cable reburial activities, and decommissioning activities (up to 50% of lost gross revenue).

2. As will be detailed further in the Fisheries Compensation Plan: (1) a claimant may take advantage of both types of claims for a single event, and (2) in the event a claim is denied initially, the claimant will be informed why.

3. The Fisheries Compensation Plan will not preclude the Certificate Holder from delegating the claims process to a third-party administrator.

ii. A narrative overview of the process for claimants to appeal any decision regarding their claims to an independent third-party arbitrator, including the ability of a claimant who is successful on appeal to seek reimbursement for any lost revenue associated with the appeal process; and

1. Certificate Holder will inform any claimant when a third-party arbitrator has been assigned to their appeal. The third party arbiter will be unbiased (*i.e.* individuals not employed by the Certificate Holder). He or she will be a practicing or retired attorney, current or former judge, arbitrator and/or mediator. In all cases, the third party arbiter will have knowledge of the offshore environment and general knowledge of various offshore activities including but not limited to fishing, shipping, surveying and offshore construction. Appeals will be provided to the third-party arbiter with the Notice of Appeal and the claimant's complete claim. No new information will be considered on appeal.

iii. A statement that the number of claims submitted by persons or entities pursuant to sections (a) (i) (1) and (2) of this section and adjudicated by the Certificate Holder shall not be limited.

b. The Certificate Holder shall file with the Secretary a summary of all claims filed, on a quarterly basis following issuance of the Certificate, including the claim type and the impacted fishing activity;

c. The Certificate Holder must notify DPS Staff, NYSAGM, NYSDEC, and NYSDOS via electronic mail within 30 days of any resolution (*i.e.*, denial or awarded) of a fisheries compensation claim. The notification must include a copy of the claim, the claim type, species impacted, and the fishing activity disrupted and/or displaced, and the resolution; and

d. The Certificate Holder shall not require any fisherman settling a fisheries compensation claim to sign a Non-Disclosure Agreement nor require waiver of any claims beyond the loss event initially claimed.

e. Following resolution of a successful claim under Condition 60 (a) that involves a repeatable incident, Certificate Holder will circulate appropriate internal messaging, including, as appropriate, to its contractors, to reduce likelihood of such recurrence.

F. Notices and Public Comments

61. The Certificate Holder shall comply with the mariner notification and input processes as provided for in Appendix J.

62. The Certificate Holder will facilitate the submission of comments through the use of a dedicated contact person. The Certificate Holder shall make available to the public a toll-free telephone number, for the duration of construction of the Project, for the purpose of answering questions and receiving complaints and feedback about the construction of the Project. All inquiries or complaints shall receive a response with an acknowledgement of receipt to the complainant within one business day. The toll-free telephone number shall include a recorded outgoing message that will, when a call is not answered by a person, provide the caller with the name of the Certificate Holder's representative as well as: (i) the number to be called at any time in case of emergency; (ii) when the caller can expect a return call, (iii) the telephone number and email address of the Secretary; and (iv) the telephone number of the NYSDPS EC&C Section.

63. The Certificate Holder's Project website shall provide a means for the public to communicate to the Certificate Holder about the Project (e.g., to register comments or ask questions) through either a direct link to a comment form or email or by providing a toll-free telephone number that will allow a representative of the Certificate Holder to respond to communications that include questions and concerns about the Project from members of the public. Certificate Holder shall post construction notices and other publicly relevant information to the Project website. The Project website shall allow users to subscribe (or unsubscribe) to receive Project updates. When subscribing to such notifications, subscribers will be able to choose whether to receive updates via electronic or regular mail to a specified address.

64. The Certificate Holder shall create a Complaint Management and Resolution Plan to be included as part of the Phase 1 EM&CP. The Complaint Management and Resolution Plan shall:

a. Require the Certificate Holder to retain, for five years following completion of construction, and for a rolling five years following commercial operation of, electronic copies of: (i) the telephone logs for any calls made to the Project's toll-free number; and (ii) any submission to the Project website. Such records shall be provided to NYSDEC and made available to DPS Staff and NYSDOS upon request.

b. Require the Certificate Holder to report to DPS Staff and NYSDEC every complaint that cannot be resolved, and describe the actions taken to address the complaint, within 10 business days after receipt of the complaint. Where the complainant provides contact information, require Certificate Holder to inform the complainant of actions Certificate Holder is taking to address the complaint.

c. Require the Certificate Holder to maintain a toll-free telephone number during the Project's commercial operation to receive complaints.

65. The Certificate Holder shall comply with the following Notice of Intent to Commence Work (Construction NOI) requirements:

a. No less than 14 days before the Commencement of Construction, the Certificate Holder shall:

i. provide the Construction NOI to the NYSDEC Bureau of Energy Project Management, Division of Environmental Permits, 625 Broadway, Albany, NY 12233-1750 and NYSDOT Region 10 Traffic Engineer, 250 Veterans Memorial Highway, Room 6A6, Hauppauge, NY 11788;

ii. provide the Construction NOI to local officials, including the Town of Brookhaven and Suffolk County Clerk, the Suffolk County DPW, and emergency personnel, including local police and fire departments;

iii. provide the Construction NOI to LIPA and/or PSEG Long Island, and any other affected utilities;

iv. provide the Construction NOI for dissemination to local media; and display in the Town Hall and public places, including but not limited to general stores, post offices, community centers, and conspicuous community bulletin boards;

v. provide the Construction NOI to the NYSDOT, NYSAGM, and DPS; and

vi. provide the Construction NOI to persons who own properties that are crossed by or abut the Project Corridor. The Certificate Holder shall give such notices by affixing them to the doors of residences or by mailing the notices via United States Postal Service Mail. The Certificate Holder shall file a copy of the generic form of the Construction NOI to the Secretary prior to the commencement of construction and shall post the same to the Project website.

b. The Construction NOI shall be written in language reasonably understandable to the average person and shall contain:

i. a map and a description of the Project;

ii. the anticipated date for the start of construction;

iii. the name, address, toll-free telephone number, and e-mail address of the Certificate Holder;

iv. a description of where to get more information about the Project including the Project website address and the location of document repositories; and

v. a statement that construction of the Project is under the jurisdiction of the Commission, which is responsible for enforcing compliance with environmental and construction conditions, and which may be contacted at an address and telephone number to be provided in the notice.

66. The following pre-construction meeting requirements shall apply to the Certificate Holder:

a. At least 14 days prior to the Commencement of Construction, the Certificate Holder shall hold a preconstruction meeting. An agenda, location, and invitation list shall be agreed upon among DPS Staff and the Certificate Holder. The Certificate Holder shall consult with DPS Staff and NYSDEC prior to finalizing the date of the meeting. The Certificate Holder shall provide notice of the meeting to all invitees at least 10 days prior to the meeting date;

b. Maps showing designated travel routes, construction worker parking and access road locations, and a general project schedule will be available at the meeting for the attendees;

c. The invitation list shall include at a minimum the onboarded contractors, DPS Staff, NYSDEC, NYSDOT, NYSDOS, NYSAGM, LIPA and/or PSEG Long Island, the Suffolk County DPW, and any impacted utility; and

d. The Certificate Holder shall supply draft minutes from this meeting to all attendees, the attendees may offer corrections or comments, which the Certificate Holder will consider in good faith, and the Certificate Holder shall issue the finalized meeting minutes to all attendees and invitees and the LICFA.

67. The Certificate Holder shall provide contractors providing services for construction of the Project with complete copies, including any amendments and modifications, of the Certificate, the EM&CP, the Order(s) approving the EM&CP, any permit issued pursuant to Section 404 of the Federal Clean Water Act, the Section 401 Water Quality Certification, and the federal consistency decision(s) issued pursuant to the federal Coastal Zone Management Act.

a. If, for any reason, the construction contractor cannot finish the construction of the Project, and a new construction contractor is needed, the Certificate Holder shall hold another pre-construction meeting using the same format as outlined above.

68. At least 14 days (or as authorized by DPS Staff) before construction of the Onshore Transmission Cable begins in any area, the Certificate Holder shall, in such area: (a) delineate both edges of the Onshore Transmission Cable Corridor, as certified, where not otherwise in a roadway; (b) stake and/or flag all Project Corridor access roads and all work pads and pulling pads; (c) where Certificate Holder has a right of access, use markers to delineate, other than in beach and ocean areas, all environmentally sensitive areas including, but not limited to, wetlands and the 100 foot adjacent and setback areas associated with regulated freshwater wetlands and the 300 foot adjacent areas associated with regulated tidal wetlands, threatened or endangered species habitat, contaminated soil areas, etc. and such markings will be left in place, and restored if disturbed, until complete of construction activities and restoration in the impacted area; (d) flag any danger trees to be removed in such area for review and comment by DPS Staff and NYSDEC; and (e) notify DPS Staff and NYSDEC when the above-described field stake-out is complete in such area.

69. During construction, the Certificate Holder shall provide DPS Staff, NYSDOT, NYSAGM, and NYSDEC with weekly status reports transmitted by electronic mail summarizing construction and indicating construction activities and locations scheduled for the following 14 days.

70. The Certificate Holder shall file a letter with the Secretary confirming that the Project has achieved commercial operation, defined as the date on which energy is sold in commercial

quantities, excluding test energy, and is transmitted through the Project (the COD or Commercial Operation), no later than 10 days after the COD.

71. Final restoration of the Project site, in accordance with the Certificate Condition 208 and approved EM&CP, may occur in phases in order to comply with required work windows and other restrictions. Where final restoration will not occur until a subsequent construction phase, the area shall be stabilized until final restoration can be achieved. Within 10 days of the completion of phase of the final restoration of the Project for each of the Onshore Transmission Cable, SRWEC–NYS, OnCS–DC, Onshore Interconnection Cable, and the Holbrook Expansion, the Certificate Holder shall file notice with the Secretary that all restoration for that phase has been completed in compliance with this Certificate and the EM&CP, and shall demonstrate that all other locations have been stabilized until the commencement of the following phase of construction. The Certificate Holder shall periodically monitor the site during the non-construction season to ensure that areas that have not achieved final restoration remain adequately stabilized. The timing of such periodic monitoring shall be described in the EM&CP. Corrective measures shall be implemented as soon as practicable for any locations where stabilization is observed to be inadequate.

G. Construction and Maintenance Windows and Timing

72. Construction and scheduled maintenance work at the Landfall Work Area and Intercoastal Waterway (ICW) crossing shall be confined to the period beginning the day after Labor Day and ending on the day before Memorial Day of the succeeding calendar year, unless further restricted by the applicable Host Community Benefit Agreement.

73. After Labor Day, Certificate Holder's construction efforts will not prevent the public from accessing the parking lot on Smith County Park. Similarly, the Certificate Holder's construction efforts will not prevent the public from accessing the fishing pier on Smith County Park unless temporarily necessary for safety purposes (e.g., movement of equipment near access point to the fishing pier). Temporary closures of the fishing pier for safety purposes shall be limited to the maximum extent practicable as detailed in the EM&CP.

74. Installation of any Project HDD may be performed on a 24-hour, 7 days a week basis, subject to any applicable construction date restrictions and any applicable Construction Noise Control Plan appended as Appendix K to the Joint Proposal, if necessary to prevent damage to or loss of the bore hole. Installing the conduit and pulling the cable through the conduit and cable splicing may be performed on a 24-hour, 7 days a week basis subject to any applicable construction date restrictions and any applicable Construction Noise Control Plan. The Certificate Holder shall provide notice to the Town 48 hours prior to the commencement of all HDD drilling, installation of an HDD conduit, and pulling of cable through an HDD conduit.

75. Species Related Work Restrictions

a. Atlantic Sturgeon. No in-water seabed disturbing work, including jet trenching trials, but not including installation and decommissioning or operation of the Equipment (as defined in Conditions 75 [d] and 81), shall occur between May 1 to June 30 and September 1 to November 30 in any year to avoid the risk for incidental take of Atlantic Sturgeon, except that the Certificate Holder may be permitted to perform the following, limited seabed disturbing work activities diver clearance and maintenance in HDD exit to locate and prepare HDD conduit end using a crane-deployed, diver-operated jetting tool; cable pull through HDD conduit; and backfill of the HDD exit with sediment or appropriate secondary protection between May 1 through May 15 and November 1 through November 30. In addition, between November 1 and November 30, the Certificate Holder shall be authorized to position and anchor vessels and place the jack-up barge or similar supporting vessel to be used in connection with HDD Drilling Operations, however the in-water punch out will not occur prior to November 30. If backfill of the HDD exit or remedial burial/secondary cable protection installation and defect remedy occurs during the restricted window (May 1 to June 30 or September 1 to November 30, Certificate Holder shall develop an Atlantic Sturgeon Monitoring and Impact Minimization Plan. Such Atlantic Sturgeon Monitoring and Impact Minimization Plan must meet the substantive requirements of 6 NYCRR Part 182, and shall be included as part of the Post-Phase 1 EM&CP. If applicable, the Certificate Holder shall provide the Atlantic Sturgeon Monitoring and Impact Minimization Plan to NYSDEC 45 days prior to filing of the Post-Phase 1 EM&CP for NYSDEC's review and comment.

b. Northern Long-Eared Bat. In order to ensure that the Project complies with the requirements of Article 11 of the ECL and 6 NYCRR Part 182 for northern long-eared bats (NLEB):

i. No Project component shall be sited or located within 150 feet of any known northern long-eared bat maternity roost, or within 0.25 mile of any known northern long-eared bat hibernaculum.

ii. No tree clearing activities shall occur at any time within 150 feet of any NLEB maternity roosts or 0.25 mile of any NLEB hibernacula. All tree clearing activities occurring greater than these distances but within 1.5 miles of a NLEB detection or 5 miles of a NLEB hibernaculum site shall be conducted between December 1 and February 28.

iii. If the conditions specified in Certificate Conditions 75 (b) (i) and (ii) cannot be met, the Certificate Holder shall consult with NYSDEC and, if applicable, USFWS, to determine what, if any, permits and/or additional authorizations are required.

iv. From March 1 to November 30, the Certificate Holder shall leave uncut all snag and cavity trees as defined under NYSDEC Program Policy ONRDLF-2 Retention on State Forests, unless their removal is necessary for the protection of human life and property. When necessary, snag and cavity trees may be removed after being cleared by the Environmental Monitor, who shall conduct a survey for bats exiting the tree. This survey shall begin 1/2 hour before sunset and continue until at least 1 hour after sunset or until it is otherwise too dark to see emerging bats. Unoccupied snag and cavity trees in the approved clearing areas shall be removed within 24-hours of the exit-count survey.

v. If at any time during the life of the Project any NLEB maternity roost trees are discovered, NYSDEC will be notified within 24 hours of discovery, and an area of at least 500 feet in radius around the roost tree(s) shall be marked and avoided until notice to continue construction, ground clearing, grading, maintenance or restoration activities, as applicable, at that site is granted by DPS after consultation with NYSDEC, except if necessary for the protection of human life and property.

vi. Except as otherwise specified, if it is determined to be necessary to take occupied habitat or individuals of NLEB, the Certificate Holder will develop a Net Conservation Benefit Plan in consultation with and accepted by NYSDEC and DPS staff that satisfies the requirements of 6 NYCRR Part 182.

c. Nesting Shorebirds. No on-beach work (*i.e.,* between the back dune and Mean Low Water) shall occur between April 1 and August 31 in any year to avoid the risk for incidental take of federally- and State-listed nesting shorebirds. This time of year restriction does not prohibit the Certificate Holder from performing construction work at the Landfall Work Area or the ICW Work Area. From April 1 to August 31, while construction is occurring at the Landfall Work Area or ICW Work Area, the Certificate Holder will immediately notify the NYSDEC if its environmental monitor, as described in Condition 122 (a), observes nesting behaviors by any above-referenced nesting shorebird within 500 feet of the Landfall Work Area or ICW Work Area.

d. Winter Flounder: Aside from the activities outlined herein, no in-water seabed disturbing activities shall occur in the ICW between December 15 and May 31 (“Winter

Flounder restricted window") in any year. This time of year restriction will not prevent the Certificate Holder from installing or decommissioning temporary, in-water equipment or structures in the ICW (the Equipment, *see also* Certificate Condition 81) to facilitate the construction of the Project within the Winter Flounder restricted window in any year during construction of the Project. If installation or decommissioning of the Equipment occurs during the Winter Flounder restricted window, the Certificate Holder shall develop a Winter Flounder Monitoring and Minimization Plan in consultation with NYSDEC. The Certificate Holder shall provide the Winter Flounder Monitoring and Minimization Plan to NYSDEC 45 days prior to filing of the Post-Phase 1 EM&CP for NYSDEC's review and comment. If, in consultation with NYSDEC, it is determined that the Equipment will result in the take of Winter Flounder, then the Certificate Holder shall implement a Winter Flounder Net Conservation Benefit Plan (NCBP) that meets the requirements of 6 NYCRR Part 182. The Winter Flounder NCBP, if necessary, shall be submitted to NYSDEC for review and acceptance prior to filing with the Secretary and commencement of construction in the relevant area.

e. If any T&E species, as defined in 6 NYCRR Part 182 or plant species identified under 6 NYCRR Part 193 are encountered on the onshore portion of the Project Corridor the following actions shall be taken:

    i. DPS Staff and NYSDEC shall be notified within 24 hours of discovery (or as soon as possible, in the event that more than 24 hours are needed to compile the required details for such reports/notifications) if the Environmental Monitor confirms a nest, roost, or area where the species were seen exhibiting any breeding or roosting behavior. In turn, and unless continued operations are necessary for protection of human life or property, the Certificate Holder shall secure the area where rights exist and safely cease construction in that area until DPS Staff, in consultation with NYSDEC, authorizes recommencement of activities;

    ii. Excluding bald eagles and unfledged piping plover chicks an area at least 500 feet in radius around the active nest or roost shall be posted and avoided until notice to continue construction, ground clearing, grading, maintenance, or restoration activities are granted by DPS Staff and NYSDEC;

    iii. An area at least 1,000 meters in radius (from the ocean-side low water line or the farthest extent of dune habitat) around the active nest with unfledged piping plover chicks shall be identified and any on-beach areas as defined in Condition 75 (c) within that radius will be avoided until notice to continue construction,

ground clearing, grading, maintenance, or restoration activities has been granted by DPS Staff and NYSDEC. Further, any on-beach areas as defined in Condition 75 (c) within that radius that are also within the Project Corridor will be posted by the Certificate Holder;

iv. For bald eagles, an area at least 660 feet in radius with a visual buffer, or 1/4 mile with no visual buffer, around the active nest or roost shall be posted and avoided until notice to continue construction, ground clearing, grading, maintenance or restoration activities are granted by DPS Staff and NYSDEC; and

v. The active nest(s) or nest tree(s) or roost(s) shall not be approached under any circumstances unless authorized by DPS Staff and NYSDEC.

f. Record All Observations of NYS Threatened or Endangered Species. During construction, restoration, operation and maintenance of the Facility and associated facilities, the Certificate Holder shall maintain a record of all observations of NYS threatened, or endangered species as follows:

i. Construction. During construction, the on-site environmental monitor shall be responsible for recording all occurrences of NYS threatened or endangered species within the Project Corridor. All occurrences shall be reported in a biweekly monitoring report submitted to the DPS Staff and NYSDEC and such reports shall include the information described in subparagraph (iii) of this paragraph. If a NYS threatened or endangered bird species is demonstrating breeding or roosting behavior, it shall be reported to the DPS Staff and NYSDEC within twenty-four (24) hours (or as soon as possible, in the event that more than 24 hours are needed to compile the required details for such reports/notifications).

ii. Post-Construction Restoration. After construction is complete, incidental observations of any NYS threatened or endangered species shall be documented and reported to the DPS Staff and NYSDEC, in accordance with the reporting requirements in subparagraph (iii) of this paragraph.

iii. Reporting Requirements. All reports of NYS and/or federally threatened or endangered species shall include the following information: species; number of individuals; age and sex of individuals (if known); observation date(s) and time(s); Global Positioning System (GPS) coordinates of each individual observed (if operation and maintenance staff do not have GPS available; the

report shall specify the nearest road or cross roads location); behavior(s) observed; identification and contact information of the observer(s); and the nature of and distance to any Facility construction, maintenance or restoration activity.

76. Construction activities shall be restricted to the hours of 7:00 a.m. to 7:00 p.m. Monday through Saturday, except for construction activity in connection with any HDD; cable pulling, grouting, and laying, cable joint splicing; OnCS–DC work, and other activities reasonably necessary to comply with NYSDOT or other contractual restrictions on daytime construction in or along roadways or public access areas. In addition to the aforementioned exceptions, this restriction shall not require the cessation of construction activities that require a continuous work effort once started (e.g., commissioning the OnCS–DC), including those specifically delineated in Section 7.2.4 of Record Exhibit 8, which requests the ability to perform certain continuous construction activities on County property. In such an event, except in cases of emergency, the Certificate Holder shall notify DPS Staff and adjacent landowners and businesses. Such notice shall be given at least 24 hours in advance unless the construction activities to be performed on a Sunday or after 7:00 p.m. are required for safety reasons that arise less than 24 hours in advance. The Certificate Holder shall implement construction noise mitigation measures set forth in the EM&CP.

77. The Certificate Holder shall use best efforts to complete onshore deliveries related to construction activities between 7:00 a.m. and 7:00 p.m., except for cable, oversized deliveries, and deliveries necessary to complete construction that are otherwise authorized to occur on a Sunday or after 7:00 p.m. This condition is not intended to prohibit nighttime deliveries reasonably necessary to facilitate compliance with NYSDOT or other contractual restrictions on daytime construction in or along roadways or public access areas or to require the cessation of construction activities that require a continuous work effort once started.

78. After consultation with the NYSDEC, NYSDOS, and DPS Staff, the Certificate Holder may petition the Commission for a modification of any construction window limitation by filing such petition with the Secretary. Such petition shall describe the consultation efforts and results of the Certificate Holder and shall include a request for a 30-day public comment period unless DPS Staff agrees that ongoing construction activities cannot reasonably be paused to accommodate a comment period.

H. SRWEC–NYS Construction

79. Prior to the commencement of construction of the SRWEC–NYS, the Certificate Holder will engage in certain offshore site preparation. Offshore site preparation shall include the

following activities, which the Certificate Holder will describe in more detail (e.g., provide methods, locations, and impact minimization measures) in the EM&CP:

a. Boulder removal through the use of a boulder grab, which will be minimized to the maximum extent practicable, will be conducted in accordance with Condition 80.

b. Pre-lay grapnel run.

80. Exclusive of the portion of the cable installed via HDD, the Certificate Holder shall install the SRWEC–NYS a minimum of six feet (measured from top of cable) below the seabed (Target Burial Depth). Should the Target Burial Depth not be achieved during the initial pass of the cable installation tool that is best suited to achieve Target Burial Depth, the Certificate Holder shall perform up to two additional passes with the installation tool, or other burial tool that complies with the requirements of the Certificate, unless (a) additional passes risk causing damage to the SRWEC–NYS or the installation tool; or (b) due to geologic obstructions, additional passes would not increase the burial depth or risk causing cable exposure (Actual Burial Depth). Certificate Holder shall use best efforts to micro-route the cable within the cable corridor to achieve Target Burial Depth during installation. If boulders are not identified during pre-construction surveys, and therefore micro-routing the cable is impracticable, the Certificate Holder shall, if required to increase the likelihood of achieving Target Burial Depth, relocate any encountered boulders within 50 feet of the planned centerline of the cable. Where Certificate Holder has relocated a boulder one meter or more in diameter a distance of two meters or more from the location where it was initially encountered, Certificate Holder shall provide electronic notice to mariners, recreational fishermen, and NYSDEC-Licensed Fishermen in accordance with Appendix J. The SRWEC–NYS shall be maintained in accordance with the Cable Monitoring and Management Plan included in the approved EM&CP (Conditions 137 and 138).

81. Certificate Holder will install in the ICW and utilize the Equipment during the construction of the Project to facilitate the movement of construction equipment and materials to the Landfall Area. The Equipment will generally be located as shown in Appendix B to the Joint Proposal. The applicable EM&CP will provide a detailed assessment of how the Equipment avoids or minimizes impacts to the environment to the maximum extent practicable considering alternative methodologies. More specifically, the EM&CP will describe how the Equipment first avoids, and if avoidance is not possible, minimizes impacts related to: (1) the seafloor, (2) shading, and (3) SAV. This assessment will include details regarding how the floating pier component of at least one of the considered options for the Equipment could be designed and constructed to avoid repetitive touching of or resting on the seafloor. Certificate Holder will similarly order Equipment to be the minimum size necessary to safely accommodate construction of the Project. In addition, the EM&CP will detail why the Equipment is most

suitable for the site, including the Equipment's ability to handle: ice loads; wind and erosion; tidal flux; and existing uses, grades, and bathymetry. Further, the EM&CP will explain why the Equipment is suitable for the duration of need to construct the Project, why it provides a safe work area, and how it reduces human safety hazards. This assessment of the Equipment will be provided to DPS Staff, NYSDEC, NYSDOS, and AGM 45 days prior to the filing of the EM&CP.

82. Pipe stringing will occur on Burma Road. No grading will occur to complete the pipe stringing activity. The final location of pipe stringing consistent with this Condition will be included in the Post-Phase 1 EM&CP and is preliminarily reflected on Appendix B to this Joint Proposal. Aside from the short period of time that the Certificate Holder will pull the pipe into the water or otherwise for public safety, recreational access to the area surrounding the pipe stringing activity will be preserved. When the pipe is pulled into the water, rollers will be used as appropriate.

83. The Certificate Holder will develop an Anchoring Plan to be provided in each applicable phase of the EM&CP that will discuss how the use of anchoring, if any, during construction and maintenance activities will avoid and/or minimize impacts to sensitive benthic habitats (Condition 89) and Significant Coastal Fish and Wildlife Habitats (e.g., use of vessels equipped with dynamic positioning systems, installing mid-line buoys) and avoid impacts to existing buried assets (e.g., telecommunications cables). The Anchoring Plan will outline the parameters for the use of anchors and spuds and identify discrete "No Anchor" areas within the corridor outlined in Appendix B in the event anchoring is ultimately required. Midline buoys or alternative measures shall be employed to minimize sediment disturbance caused by anchor sweeps during construction of the SRWEC–NYES, as will be described in the Anchoring Plan. The Certificate Holder shall provide the Anchoring Plan at least 45 days prior to filing the EM&CP to DPS Staff, NYSDOS, and NYSDEC for review and comment.

84. In the event of an anchor strike with the SRWEC–NYS, the Certificate Holder shall notify DPS Staff no later than 48 hours and subsequently file a letter with the Secretary identifying the details of the incident and anticipated next steps as soon as that report is finalized.

85. The Certificate Holder shall utilize the Smith Point Bridge as often as possible to transport equipment and materials to the Landfall HDD Work Area. Ultimately, decisions as to what equipment and materials can be transported over the Smith Point Bridge will be made by the County.

86. The Certificate Holder agrees to minimize utility crossings along the SRWEC-NYS route to the maximum extent practicable.

87. Certificate Holder shall install the SRWEC–NYS, exclusive of the Landfall HDD and offshore HDD exit, using either simultaneous lay and burial or pre-lay and post-burial processes.

a. The following processes may be used, individually or in combination, to install the SRWEC–NYS, exclusive of the HDD: mechanical cutter, mechanical plow (which may include a jetting system), jet sled, jet trencher, controlled flow excavator, boulder grab, and/or trailing suction hopper dredge.

88. Certificate Holder will use best efforts to avoid the use of cable protection if the actual burial depth achieved provides adequate protection. In areas where seabed conditions, geologic or topographic features, or utility crossings do not allow Certificate Holder to achieve Burial Depth, Certificate Holder is authorized, but not required, to use cable protection methods. Cable protection may include tapered engineered concrete mattresses, rock bags, or crushed rock. Certificate Holder shall install and maintain any necessary cable protection measures in a manner that is consistent with the objectives of Condition 56 (d), (e) (i.e. ability to maintain overtrawlability, minimize shifting over time, and avoids creating a discernable berm). Following construction of the SRWEC–NYS, Certificate Holder shall not leave any portions of the cable exposed on the seabed without cable protection measures unless otherwise authorized by these Certificate Conditions or the EM&CP. As part of decommissioning, the Certificate Holder shall survey and use best efforts to remove installed cable protection measures that are within two feet of the seabed surface.

89. Unless otherwise authorized by the Certificate or the EM&CP, the Certificate Holder must avoid impacts to sensitive benthic habitats (i.e., hard bottom habitat, commercial shellfish beds, salt marsh, submerged aquatic vegetation, and corals) in NYS.

90. In-water activities shall be undertaken in a manner that minimizes the potential for interference with navigation, and other water-dependent uses of the area, including but not limited to fishing, boating, and recreation.

91. The Certificate Holder may use a casing pipe, or similarly Commission-approved containment structure (collectively referred to as Temporary Containment), or no containment structure, around the offshore HDD exit during construction. Final details regarding whether a Temporary Containment will be used, and, if so, the type, design, and installation method shall be included in the EM&CP. Any Temporary Containment shall be fully removed prior to the Commercial Operation Date, but no longer than 30 days after the installation of the cable in NYS waters. If a Temporary Containment is used, the Certificate Holder shall provide electronic notice of its location to mariners, recreational fishermen, and NYSDEC-Licensed Fishermen in accordance with Appendix J, and any Temporary Containment will be marked in accordance with applicable USCG requirements.

92. The SRWEC–NYS Landfall HDD will be installed at a depth that will provide sufficient cable burial and at a minimum of six feet below the seafloor, exclusive of the transition points

associated with the entry and exit positions of the HDD, whereby the conduit will be buried below surface level upon completion. The TJB shall be located underground within the parking lot of the Smith Point County Park on Fire Island in the Town of Brookhaven with two manhole covers at the surface.

93. The following sub conditions apply to all Project HDDs:

a. The Certificate Holder shall include, as part of the Post-Phase 1 EM&CP, an Inadvertent Returns Plan that provides for the detection and correction of accidental releases of drilling fluids, as well as the Safety Data Sheets (SDS) for the drilling fluids;

b. Certificate Holder shall use best efforts to recover and dispose of all HDD drilling fluids and cuttings as specified in Condition 197;

c. Certificate Holder shall not intentionally release and shall use best efforts to prevent the inadvertent release of HDD drilling fluids or cuttings outside the confines of the HDD operation. Certificate Holder shall comply with the Inadvertent Returns Plan as described herein to mitigate and minimize the impacts of any such releases; and

d. All drilling fluid additives must be water-based unless otherwise approved by DPS Staff in consultation with NYSDEC. If a polymer-based additive is proposed, it must be included in the EM&CP with the corresponding SDS containing eco-toxicity information and approved NYSDEC Water Treatment Chemical Form. Petroleum-based additives are strictly prohibited. If a polymer-based additive is proposed, the Certificate Holder will propose to use a biodegradable polymer-based additive if a suitable product exists.

94. With respect to the Landfall HDD, ICW HDD, and SRWEC-NYS, no changes in the installation technology or reduction in the minimum depths specified in these Conditions shall be allowed without prior consultation with NYSDEC and a written statement from NYSDOS stating that the deviation would not result in coastal effects that differ significantly from the coastal effects reviewed by NYSDOS in Certificate Holder's original federal coastal consistency certification (Coastal Consistency Certification). If NYSDOS determines that such deviation would result in coastal effects that differ significantly from those reviewed in the Coastal Consistency Certification, the Certificate Holder shall seek a written concurrence from NYSDOS for any such Project changes that would require an amendment to the Certificate Holder's Coastal Consistency Certification. Nothing in this Certificate shall be construed to

limit or expand any rights the Certificate Holder may have to seek administrative or judicial review of any action or inaction by NYSDOS relating to any such deviation.

95. During construction activities at the offshore HDD exit, the Certificate Holder shall provide to DPS Staff, NYSDEC, and NYSDOS weekly progress reports that document compliance with Certificate requirements and such other information as determined necessary based on consultation with those agencies.

    a. All work activities will be closely coordinated with the USACE, the USCG; and applicable federal, State, and local agencies and other local pilot associations, as Certificate Holder determines determined to be necessary to minimize or avoid impacts. This coordination process will be detailed further in the Certificate Holder's Post-Phase 1 EM&CP and identify any coordination of the requirements in Appendix J.

I. Onshore Transmission Cable Construction

96. Unless otherwise required by the underlying property owner, the Onshore Transmission Cable will be installed in an underground duct bank consisting of concrete encased conduits, utilizing cable vaults for installation and maintenance access. Each vault will be accessible by up to two manhole covers visible from the surface.

97. The method for installation of the Onshore Transmission Cable within the NYSDOT ROW will be detailed in the Phase 1 EM&CP and comply with NYSDOT specifications. Prior to filing the EM&CP, the Certificate Holder shall consult with the NYSDOT.

98. Certificate Holder shall instruct its contractors to park in designated areas identified in the EM&CP pursuant to Conditions 66 (b) and 120.

99. The Certificate Holder shall use best efforts to minimize vegetation disturbance and removal within the NYSDOT- and County-owned highway ROW and Town-owned ROW.

100. The Certificate Holder shall coordinate construction activities with other construction and maintenance activities taking place at the same time and in the same vicinity by the NYSDOT and County, local Highway Departments, and the Long Island Railroad (LIRR). Where the proposed cable route intersects with planned or ongoing transportation infrastructure improvements, cable design, installation methods and installation schedule will be planned to accommodate those transportation facilities. Details of construction schedule planning and coordination with these entities shall be included in each applicable EM&CP.

101. Unless otherwise necessary for safety purposes, the Certificate Holder shall maintain continual pedestrian and vehicular use of and access to park amenities within Smith Point County Park on Fire Island, Smith Point County Marina, Southaven County Park in the Town of Brookhaven, and all other existing public access areas.

102. Certificate Holder shall design, engineer, and construct the Project in accordance with the applicable and published planning and design standards of the New York Independent System Operator, Inc.; New York State Reliability Council; the Northeast Power Coordinating Council; the North American Electric Reliability Corporation; and successor organizations.

103. The Certificate Holder shall coordinate with LIPA and/or PSEG Long Island to minimize outages. In the event a customer outage is necessary to facilitate construction, Certificate Holder will confidentially file notice of the same with the Commission's Records Access Officer. Within 60 days of Commission issuance of a Certificate, begin the process of consulting with LIPA and/or PSEG Long Island regarding the Project's construction schedule to, among other things, coordinate system outage requirements, if any, and avoid or minimize conflicts with LIPA's and/or PSEG Long Island's internal construction programs.

104. The Certificate Holder shall be responsible for inspecting all culverts within the Project Corridor and determine that they are not crushed, blocked, or otherwise damaged by the Certificate Holder during construction, restoration, and/or decommissioning of the Project. If such culvert is blocked, crushed, or otherwise damaged by the Certificate Holder or its contractors during construction, restoration, and/or decommissioning, the Certificate Holder shall, where feasible, immediately, repair the culvert or replace it with alternative measures appropriate to maintaining proper aquatic connectivity and stream or stormwater flows. Culvert repairs or replacement must not result in reduced opening width or height.

105. The Certificate Holder shall thoroughly clear the areas of debris on the Onshore Transmission Cable related to underground electric line construction.

106. The Certificate Holder shall take appropriate measures, as outlined in the EM&CP, to minimize fugitive dust and airborne debris from construction activities. Except where such activities may create ice, exposed soils and roadways shall be wetted as needed during extended dry periods to minimize dust generation. To the extent practicable, water for dust control shall come from municipal water supplies/sources. If contamination in the ground is detected during construction of the Onshore Transmission Cable and OnCS–DC, and such contamination is of the kind that will lead to volatilization or off-gassing of such contamination or chemical constituents thereof, the Certificate Holders shall contact NYSDOH, NYSDEC, and DPS Staff prior to further disturbance. Additionally, the Certificate Holder shall conform to practices and procedures described in the DER-10/Technical Guidance for Site Investigation and

Remediation and the NYSDOH Generic Community Air Monitoring Plan (CAMP), to the extent applicable.

107. Following construction, the onshore Project Corridor as impacted by the Certificate Holder or its contractors shall be restored to pre-construction contours, unless the EM&CP specifies otherwise. Erosion controls and permanent vegetation shall be restored as appropriate for those locations. Disturbed pavement, curbs, and sidewalks (if applicable) shall be restored by Certificate Holder to their preconstruction condition or improved, or as otherwise addressed in an applicable agreement with the local government.

108. The Certificate Holder shall file with the Secretary as-built drawings of the Project, certified by a Professional Engineer or Licensed Land Surveyor that is licensed in New York State showing the final installation route and location of the Project as defined in Appendix B within 120 days following the COD. At the same time the as-built drawings are provided to the Secretary, the accompanying GIS files will be provided to DPS Staff, NYSDEC, NYSDOS, NYSDOT, and AGM.

109. Certificate Holder shall, upon completion of construction of the Project:

a. Conduct an assessment of the need for additional restoration work and landscape improvements, including vegetation planting, earthwork or installed features to screen or landscape at the OnCS–DC. Landscape improvement assessments shall be conducted in consultation with the Town and landowners where applicable.

b. Prepare plans for any visual mitigation found necessary, and, in connection therewith, removal, rearrangement and supplementation of existing landscape improvements or plantings should be considered, as appropriate.

c. Present draft assessments and visual mitigation plans to DPS Staff for review and comment, and file a final plan with the Secretary within one year after the date the Project is placed in service.

d. Install, as appropriate, visual mitigation measures as identified in final plans as outlined in (a) through (c), above.

110. A Highway Work Plan governing activities within highway rights-of-way, prepared in coordination with the municipal Highway Departments, NYSDOT and DPS Staff, and in compliance with 17 NYCRR Part 131, shall be included in each applicable EM&CP, and shall cover at a minimum:

a. an estimated schedule showing the sequence and duration of trenching, drilling and/or pipejacking, cable delivery and laying, backfilling, splicing, and testing;

b. a traffic diversion/lane closure plan, as described in Condition 43 (d), which shall identify procedures to be used to maintain traffic and provide a safe construction zone for those activities within the roadway ROW. The plan shall also describe temporary signage, lane closures, placement of temporary barriers and traffic diversion. Flaggers shall always be present when equipment is crossing any road, when equipment is being loaded or unloaded, and where two-lane traffic has been reduced to one lane;

c. coordination with planned highway and bridge construction, as described in Condition 43 (f), and repair projects;

d. a map showing the location of: the trench with reference to the paved highway surface, lay down and mobilization areas, drilling and HDD exit, pipejacking entry and exit, and splicing locations;

e. trench profile;

f. a plan for trench backfilling, marking and protection, and temporary covering; and

g. a plan for trenching and cable laying in the vicinity of other underground utility lines, conduits and pipes.

J. Contractors and Contractor Supplies/Materials

111. The Certificate Holder shall notify all contractors that the Commission may seek to recover penalties for violation of the Certificate, not only from the Certificate Holder, but also from its contractors, and that contractors may also be liable for other fines, penalties, and environmental damage caused by their actions.

112. The Certificate Holder's employees, contractors, and subcontractors assigned to the construction of the Project shall be properly trained in their respective responsibilities.

113. At least 14 days prior to construction, the Certificate Holder shall file a report with the Secretary confirming that required construction materials are available. For purposes of this paragraph, an item of construction material is available: (i) if it is located at a marshalling yard; (ii) if it is in a Certificate Holder warehouse or other routine Certificate Holder inventory

stocking location; or (iii) if it is on order from a vendor with a scheduled delivery date prior to the time scheduled for its use in the Project.

114. All equipment shall be located at the laydown yard, work area, or on the Project Corridor, provided, however, that if a local contractor is used for the work, the local contractor's facility shall be considered as a marshalling yard or laydown area.

115. If an Occupational Safety and Health Administration (OSHA)-recordable construction accident (*e.g.*, loss of consciousness and fractured bone) in connection with work on the Project, the Certificate Holder shall report any such accident to DPS Staff as soon as possible, but no later than 24 hours after Certificate Holder becomes aware of such accident. A copy of the accident report, if any, shall be provided to DPS Staff after it has been finalized.

116. If a contractor installs materials, structures, or components that do not meet or exceed the specifications for the same described in the approved EM&CP, the Certificate Holder shall immediately notify DPS Staff of the deviation. The Certificate Holder will develop in consultation with the DPS Staff plans for remedial action, and within 30 days after becoming aware of such deviation, the Certificate Holder shall prepare and deliver to DPS Staff a summary report detailing the deviation and the steps to be, or that have been, taken to address the deviation.

117. The Certificate Holder shall develop a quality control plan (Quality Control Plan) for inclusion in the Phase 1 EM&CP describing how it will ensure that the transmission line structures and components it purchases for the Project conform to the specification for structures and components described in the approved EM&CP. At a minimum, the Quality Control Plan shall include: (i) the name(s), if available and qualifications of the individual(s) who will conduct audits under the Quality Control Plan (Quality Control Audits); and (ii) the frequency with which the Quality Control Audits will be performed.

118. Within 10 business days following completion of each Quality Control Audit, the Certificate Holder shall provide to DPS Staff a report of such audit that includes: (i) a description of the results of the audit, particularly with respect to results that identify that one or more structures or components the Certificate Holder purchased for installation in the Project did not conform to the specifications for structures or components described in the approved EM&CP; and (ii) any notes pertinent to the subject matter of such audit which were made at audit meetings by Certificate Holder personnel and/or contractors who performed the audit.

119. If any Quality Control Audit conducted by the Certificate Holder identifies that one or more structures or components the Certificate Holder purchased for installation in the Project did not conform to the specification for structures and components described in the approved

EM&CP, the Certificate Holder shall: (i) provide written notification to the Secretary within not more than 72 hours of the Certificate Holder's discovery of such non-conformity; and (ii) describe the steps the Certificate Holder will take to correct the non-conformity, including whether any components must be dismantled and returned to the manufacturer.

120. The Certificate Holder shall avoid direct disturbance to properties by accessing the Project from existing roadways or off-ROW access roads as identified in the EM&CP. Parking for Project construction workers shall be in designated areas identified in the EM&CP that do not interfere with normal traffic, cause a safety hazard, or interfere with existing land uses. Certificate Holder shall minimize on-site parking for workers where practicable. If a designated parking area is required within NYSDOT ROW, NYSDOT will be consulted on the location prior to filing the EM&CP.

K. Oversight and Supervision

121. During construction, the Certificate Holder shall retain at least five individual monitors for Project oversight, as follows:

a. One independent, third party full-time environmental monitor. The Certificate Holder must assign at least one additional environmental monitor(s) for the duration of all in-water work if such work is undertaken simultaneously with Onshore Transmission Cable and/or OnCS–DC construction activities (Aquatic Environmental Monitor). The environmental monitor must be on-site during all construction activities that take place outside of the time period 7:00 a.m. to 7:00 p.m.

b. One independent, third party full-time Fishing Interests Monitor/Representative. The monitor must be on-site during all construction activities that take place in NYS commercial fishing waters;

c. One full-time construction supervisor;

d. One full-time safety inspector; and

e. One full-time quality assurance inspector.

122. Fourteen (14) days in advance of Project construction, the Certificate Holder shall provide an Environmental Compliance Plan regarding the environmental monitor to DPS Staff and NYSDEC for review and comment. The Environmental Compliance Plan must include the following information:

a. The Certificate Holder shall ensure that the names and qualifications of its environmental monitor, Aquatic Environmental Monitor, Fishing Interests Monitor/Representative, safety inspector, quality assurance inspector, and construction supervisor are submitted to DPS Staff at least two weeks prior to the start of construction of the Project. The Certificate Holder shall ensure that its environmental monitor's qualifications satisfy those of a "Qualified Inspector" pursuant to the SPDES General Permit.

b. Organization structure, including specific names, duties, and responsibilities.

c. Certification confirming the independence of the environmental monitor(s) from the Certificate Holder.

d. The procedures established to ensure compliance with the Certificate and the applicable ECL provisions and implementing regulations.

e. Environmental compliance tracking and reporting procedures, including:

    i. Checklist of matters to inspect for compliance, including specific items or locations to be inspected and acceptability criteria to be applied by the environmental monitor(s);

    ii. Purpose and frequency of reports;

    iii. Environmental compliance schedule;

    iv. Methods of reporting non-compliance with Certificate Conditions and the ECL and implementing regulations; and

    v. QA/QC procedures for environmental compliance.

f. Procedure for the Certificate Holder to respond to and correct problems found by the environmental monitors.

123. During periods of relative inactivity on the Project, after consultation with and acceptance from DPS Staff, the Certificate Holder may temporarily decrease the number of hours worked by Project oversight personnel and the extent of their presence at the Project site commensurate with the decline in Project activity. Likewise, during periods of relatively high activity on the Project, the number of inspectors and the extent of their presence at the Project site may be

temporarily increased commensurate with the increase in activity levels. The Certificate Holder shall ensure that the frequency of inspections by the environmental monitor(s) comply with the requirements of the SPDES General Permit.

124. Subject to Condition 128, the environmental monitor(s) shall have stop work authority over aspects of the Project that could violate the terms of the Certificate, EM&CP, or the § 401 Water Quality Certification.

125. The Certificate Holder shall provide to DPS Staff and the Town the cell phone numbers and weekly schedules of the Certificate Holder's environmental monitor(s), safety inspector, quality assurance inspector, and construction supervisor(s).

126. The environmental monitor(s) and construction supervisor(s) shall be equipped with sufficient documentation, transportation, and communication equipment to effectively monitor contractor compliance with the provisions of this Certificate, applicable sections of the PSL, ECL, and the Town's Code; the EM&CP; every Commission order issued in this proceeding; and the § 401 Water Quality Certification.

127. Subject to the requirements of Conditions 30 and 31, NYSDEC and NYSDOS representatives shall be permitted scheduled visits to the Project site.

128. The authority granted in the Certificate and any subsequent order(s) in this proceeding is subject to the following conditions necessary to ensure compliance with such order(s):

    a. The Certificate Holder shall regard DPS Staff representatives (authorized pursuant to PSL § 8) as the Commission's designated representatives in the field. In the event of any emergency resulting from the specific construction or maintenance activities that violate or may violate the terms of the Certificate or any other order in this Proceeding, such DPS Staff representatives may issue a stop-work order for that location or activity.

    b. A stop-work order shall expire in 24 hours unless confirmed by at least a single Commissioner. If a stop-work order is confirmed, the Certificate Holder may seek reconsideration from the confirming Commissioner or all Commissioners. If the emergency prompting the issuance of a stop-work order is resolved to the satisfaction of the Commissioner or the Commission, the stop-work order will be lifted. If the emergency has not been satisfactorily resolved, the stop-work order will remain in effect.

c. Stop-work authority will be exercised sparingly and with due regard to environmental impacts, economic costs involved, public health and safety, possible impact on construction activities, worker health and safety, and whether an applicable statute or regulation is violated. Before exercising such authority, DPS Staff representatives will, wherever practicable, consult with the Certificate Holder representatives possessing comparable authority. Within reasonable time constraints, all attempts will be made to address any issue and resolve any dispute in the field. In the event the dispute cannot be resolved, the matter will be immediately brought to the attention of the Certificate Holder, the project manager, and the Director of the EC&C Section of the Office of Electric, Gas and Water. In the event that a DPS Staff representative issues a stop-work order, neither the Certificate Holder nor the contractor will be prevented from undertaking any such safety-related activities as they deem necessary and appropriate under the circumstances. The issuance of a stop-work order or implementation of measures, as described below, may be directed at the sole discretion of the DPS Staff representative during these consultations.

d. If a DPS Staff representative discovers that a specific activity is a significant environmental threat that is, or may immediately become, a violation of the Certificate, Water Quality Certification, or any other order in this Proceeding, the DPS Staff representative may—in the absence of responsible Certificate Holder supervisory personnel or the presence of such personnel who, after consultation with the DPS Staff representative, refuse to take appropriate action—direct the field crews to stop the specific environmentally harmful activity immediately. If responsible Certificate Holder personnel are not on site, the DPS Staff representative will immediately thereafter inform the supervisor and/or environmental monitor of the action taken. The DPS Staff representative may lift the stop-work directive if the situation prompting its issuance is resolved.

e. If the DPS Staff representative determines that a significant threat exists such that protection of the public or the environment at a particular location requires the immediate implementation of specific measures, the DPS Staff representative may, in the absence of responsible Certificate Holder supervisory personnel, or in the presence of such personnel who, after consultation with the DPS Staff representative, refuse to take appropriate action, direct the Certificate Holder or its contractors to implement corrective measures. The field crews shall comply with the DPS Staff representative directive immediately. The DPS Staff representative will immediately thereafter inform the Certificate Holder's supervisor or environmental monitor of the action taken.

129. Certificate Holder shall organize and conduct site compliance audit inspections for DPS Staff and NYSDEC, as needed, but not less frequently than once per month during the construction and restoration phases of the Project. Inspections shall conclude upon the final sign-off of the SWPPP by the SWPPP inspector.

a. Once per month, the inspection shall include a review of the status of compliance with all certification conditions, requirements, and commitments, as well as a field review of the Project site, if necessary. The inspection shall also include:

i. review of all complaints received, and their proposed or actual resolutions;

ii. review of any significant comments, concerns, or suggestions made by the public, local governments, or other agencies;

iii. review of the status of the Project in relation to the overall schedule established prior to the commencement of construction; and

iv. other items the Certificate Holder or DPS Staff consider appropriate.

b. The Certificate Holder shall provide draft minutes of the inspection audit and/or meeting, including resolution of issues and additional measures to be taken, to DPS Staff and all attendees for corrections or comments. Thereafter, the Certificate Holder shall issue to DPS Staff and NYSDEC, the final written record of the results of the inspection audit as part of its scheduled construction update reports, describing resolution of issues and additional measures to be taken.

L. Roads and Transportation

130. The Certificate Holder shall coordinate all construction work on the Onshore Transmission Cable with the appropriate State (including the NYSDOT Transportation Management Center in Hauppauge) and municipal officials and shall obtain the required authorization for such work, subject to the Commission's continuing jurisdiction as appropriate. The Certificate Holder shall periodically consult with State and local highway transportation agencies about traffic conditions near the Project site and shall notify each such transportation agency of the approximate date manhole-related work will begin within highways under their respective jurisdictions.

131. Where New York State highway ROW is to be occupied, all work will be performed in accordance with applicable regulations and standards, including 17 NYCRR Part 131 covering

Accommodations of Utilities within State Highway ROW, the applicable design standards of the *American Association of State Highway and Transportation Officials, NYSDOT's Requirements for the Design and Construction of Underground Utility Installations within the State Highway Right-of-Way, Manual of Uniform Traffic Control Devices* and New York State Supplement, and *the Highway Design Manual*. All necessary work permits will be obtained for any work in, on, under, or over State Highway ROW, which includes areas and facilities such as shoulders, guiderails, clear zones, vegetated areas, slopes, and drainage facilities in addition to paved roads. Copies of all required permits will be filed with the Secretary prior to commencement of the work requiring such permits.

132. The Certificate Holder, with respect to all work it performs on the Onshore Transmission Cable, shall coordinate with all appropriate agencies, including the NYSDOT and local highway departments, regarding an MPT that details traffic management of roads under State and municipal jurisdiction. The MPT shall address temporary signage, lane closures, placement of temporary barriers, and traffic diversion and be included as part of the EM&CP.

133. Impacts to LIRR associated with the installation of the Onshore Transmission Cable are anticipated to be minor, temporary, and localized. Equipment delivery and installation stages will be closely coordinated with the LIRR to avoid or minimize conflicts with on-going railroad operations. Active rail lines will be crossed using trenchless methods, not by open cut trenching. Once installed, the Onshore Transmission Cable will be buried within the railroad ROW and have no effect on railroad operations.

134. Neither the Certificate Holder nor any contractors in its employ shall construct any new or improve any existing access roads not described in the EM&CP except in the case of emergency situations. A notice of any such emergency shall be promptly filed with the Secretary. Access roads do not include public rights of way.

135. NYSDOT and local highway departments shall have authority to place inspectors on site to monitor and observe the Certificate Holder's activities on State Highways and local roads, or to request the presence of State or local police to ensure the safety of highway travelers, at such times and for such periods as NYSDOT deems appropriate. All costs thereof shall be borne by the Certificate Holder.

136. The Certificate Holder shall comply with the following provisions for snow and ice removal on all roads on which Project construction is occurring.

    a. Interference with snow plowing operations by drums, barricades, and other traffic control equipment shall be kept to a minimum. Any devices disturbed or damaged

by snow and ice control operations shall be replaced and/or reset as necessary and as soon as possible by the Certificate Holder;

b. Excluding the Onshore Transmission Cable HDD work zone, drainage frames, grates and covers and other castings shall not be adjusted in a travel lane unless the final pavement course is to be placed prior to the onset of snow and ice weather. Steel plates, etc. shall not protrude above the adjacent pavement. If any of these protrusions exist in a non-travel lane prior to a snow and ice condition, then temporary asphalt ramps must be placed so that for every one inch of rise, there is a six-foot run of ramp;

c. All pavement cuts shall be made or maintained to eliminate recessed areas where snow cannot be plowed or where the plows may snag; and

d. Where the work zone traffic control schemes require installation of single or multiple runs of temporary concrete barrier, the Certificate Holder shall remove any snow remaining along the temporary barrier.

M. Monitoring and Mitigation

137. The Certificate Holder shall submit, after prior consultation with DPS Staff, NYSDEC, and NYSDOS, cable monitoring and management plan (SRWEC –NYS Maintenance Plan) as part of the Post-Phase 1 EM&CP, which shall include, at a minimum:

a. the method for determining the actual cable location and burial depth of the SRWEC–NYS and the timing for undertaking such efforts, including, for example, the use of distributed temperature sensing (DTS) technology;

b. A requirement that the Certificate Holder establish depth of burial relative to seabed and the accurate level of the seabed relative to vertical datum during post-construction survey operations. Following this, the Certificate Holder will conduct multibeam echo sounder (MBES) surveys to inspect the HDD exit and export cable in Commercial Operation in: year 1, between years 2 and 3, and between years 5 and 8. Throughout the operational life of the Project additional MBES surveys will be conducted after 1-in-50 year storm events as will be defined in the EM&CP based on wave height, currents, and/or wind speed, and associated temporal descriptions, and after any cable repair activity. Timing/frequency of inspections following year 8 and additional to these will be determined through application of a risk-based assessment to ensure required cable burial. This risk-based assessment will be described and detailed further in the EM&CP.

i. The risk-based assessment shall identify a risk to exist if the SRWEC–NYS reaches a burial depth less than four feet (measured from top of cable) below the seabed for greater than 25 linear feet, in areas where Actual Burial Depth at the time of installation was greater than four feet. If this risk is identified, Certificate Holder shall follow the process outlined in Condition 138 (a).

c. a plan for remedying cable exposures within time-of-year restrictions;

d. a risk-based assessment and plan for remedying exposures outside of time-of-year restrictions that pose a hazard to public safety, navigation, or marine resources, including avoidance and minimization techniques for T&E species;

e. a requirement to take an EMF reading at the Landfall Work Area in the event of a cable exposure;

f. a description of methods to maintain burial depth;

g. a plan for marking the location of any cable exposures; and

h. the design profile of the Landfall Work Area, including anticipated depth along the profile, will be included in the applicable EM&CP. The Certificate Holder shall consult with NYSDEC regarding restoration activities above the HDD installation and comply with applicable State and federal regulatory requirements.

138. The SRWEC–NYS Maintenance Plan shall specify that if the Certificate Holder finds or is alerted that the burial depth poses an unacceptable risk to public safety, navigation, or marine resources, or the integrity of the SRWEC–NYS as per the risk-based assessment, the Certificate Holder shall undertake remedial measures including burial and/or protection measures consistent with the Certificate and approved EM&CP. Before undertaking any such remedial action, the Certificate Holder shall provide a notice to DPS Staff, NYSDOS, and NYSDEC describing its immediate and long-term plan of actions for reducing the risk to acceptable levels while minimizing impacts. The Certificate Holder shall notify mariners, recreational fishermen, and NYSDEC-Licensed Fishermen in accordance with the process set forth in Conditions 61 and Appendix J.

a. The SRWEC–NYS Maintenance Plan shall further specify that, in the event the cable's burial depth is determined to pose a risk as defined in Condition 137 (b) (i), the Certificate Holder will consult with DPS Staff, NYSDEC, and NYSDOS and a determination will be made as to whether the cable poses an unacceptable risk to

existing uses or resources per the risk-based assessment and necessitates remedial action consistent with the Certificate and approved EM&CP. Before undertaking any such remedial action, the Certificate Holder shall provide a notice describing its immediate and long-term plan of actions for reducing the risk to acceptable levels while minimizing impacts to DPS Staff, NYSDOS, and NYSDEC. The Certificate Holder shall notify mariners, recreational fishermen, and NYSDEC-Licensed Fishermen in accordance with the process set forth in Appendix J.

139. The Certificate Holder shall be responsible for remedying any exposure of the SRWEC–NYS in accordance with the SRWEC–NYS Maintenance Plan. If the Certificate Holder does not begin implementing the SRWEC–NYS Maintenance Plan within 10 days of the date the Certificate Holder is notified of such SRWEC–NYS exposure, or if the Certificate Holder ceases to diligently implement the SRWEC–NYS Maintenance Plan with respect to such exposure to the reasonable satisfaction of the Commission, the appropriate letter of credit identified in Condition 209 may be drawn upon pursuant to the terms of Condition 209. Within 120 days of Commercial Operation, the Certificate Holder shall submit to DPS Staff, NYSDEC, NYSDOT, NYSDOS, and LICFA as-built drawings and shapefile data providing final elevations of the cable and seabed and actual burial depth of the cable and locations of any cable protection measures; also, drawings will include locations and type of cable protection measures installed along the Project.

140. The Certificate Holder shall include as Appendix N of the Joint Proposal, a Benthic Sampling Plan that provides for one pre-cable installation benthic sampling survey and at least two post-cable installation benthic sampling surveys for the area along the SRWEC–NYS from the proposed HDD exit offshore to the territorial limit of NYS waters (the Benthic Sampling Plan). The Benthic Sampling Plan will specify that:

a. pre-construction sampling shall occur between August 1 and October 31, prior to construction, at intervals of 1,000 feet along the proposed centerline of the SRWEC–NYS cable corridor from the proposed offshore HDD exit to the territorial limit of NYS waters;

i. the pre-construction survey shall consist of the collection and analysis of at least three replicate paired images from each station collected with a Sediment Profile Imaging/Plan-View Imaging system (SPI/PV) consistent with the techniques utilized in the Application. If feasible in connection with post-Certificate, pre-construction survey efforts, at each SPI/PV station a Conductivity, Temperature, Depth sensor will be used to measure the salinity and temperature through the water column to the sediment surface.

ii. The SPI/PV sampling will be supplemented with three replicate grab samples collected at intervals of 2,000 feet. A minimum of three replicate grab samples will be analyzed and results will be summarized with metrics.

iii. The variance estimated from these data will be used in a statistical power analysis for the comparison of these metrics between pre- and post-installation time periods. Results of the statistical power analysis and estimation of ecologically meaningful difference will be presented to NYSDEC for review prior to the post-construction sampling surveys.

b. The post-construction benthic sampling shall occur between August 1 and October 31, within 24 months of the Project's commercial operation date, in an area extending approximately 100 feet on either side of the SRWEC–NYS. The Benthic Sampling Plan shall explain that:

i. during the post-construction benthic sampling, 3 stations will be sampled with SPI/PV in a transect perpendicular to the SRWEC–NYS at the centerline with 1 station as close as practicable to the centerline and 1 station approximately 100 feet on either side at 1,000-foot intervals from the HDD exit pit offshore to the territorial limit of NYS waters. At each SPI/PV station a Conductivity, Temperature, Depth sensor will be used to measure the salinity and temperature through the water column to the sediment surface. At each station, a minimum of three replicate images shall be collected and analyzed.

ii. The SPI/PV sampling will be supplemented with two grab stations with one station as close as practicable to the centerline and 1 station approximately 100 feet on the eastern side of the cable with three replicate grab samples collected at intervals of 2,000 feet. One of the replicate grab samples will be tested, and the remaining replicates will be archived. Where analysis indicates that there is an ecologically meaningful difference with pre-installation results, the additional replicates will be analyzed.

iii. Sediment temperature shall be recorded at each SPI/PV station.

141. The Benthic Sampling Plan shall require that results of the pre-cable installation SPI/PV benthic sampling event and of the post-cable installation benthic sampling event shall be submitted to DPS Staff, NYSDOS, NYSAGM, and NYSDEC in a final written report within six months of the completion of each sampling event. An additional report shall, as applicable, summarize EMF and thermal impacts during each study period and evaluate the effects on

benthic community metrics before and after construction. The results of the benthic community analysis (BCA) will be provided as a supplement of the report within nine months of the completion of each sampling event

142. The Certificate Holder shall include as Appendix O of the Joint Proposal, a Fisheries Monitoring Plan that provides for at minimum one year, and a goal of two years, of pre-cable installation fisheries studies and at least two years of post-cable installation fisheries studies for the area along the SRWEC-NYS. The Fisheries Monitoring Plan shall include an acoustic telemetry study to assess the potential impacts of the SRWEC on the behavior and migratory patterns of commercially and ecologically important species in the coastal waters south of Long Island. A draft Fisheries Monitoring Plan has been developed and presented to state and federal resource agencies and fishing industry stakeholders for review and comment.

143. The Fisheries Monitoring Plan will include the use of acoustic transmitters on lobsters, horseshoe crabs, winter skates, smooth dogfish, sandbar sharks, dusty sharks, and sand tiger sharks, and the deployment of an array of acoustic receivers in the nearshore area of the SRWEC-NYS, to evaluate the effects of EMF on behavior and movement of targeted species before, during, and after construction.

144. The Certificate Holder shall provide funding for five study years and shall use best efforts to collect two years of pre-construction data, one year of data during construction, and two years of data following commercial operation of the SRWEC-NYS.

145. Annual reports will be prepared after the conclusion of each year of telemetry monitoring and will be made available in accordance with Section 12.07 of the OREC Agreement. Following conclusion of the monitoring study, one final report will also be produced synthesizing the findings of the pre- and post- construction evaluations. The Certificate Holder shall file a notice with the Secretary when the consolidated report is available.

146. The Certificate Holder shall make publicly available survey data collected during the completion of the Benthic Sampling Plan and Fisheries Monitoring Plan in shapefile and PDF format. The Post-Construction EMF Report (Condition 22) and the EMF Verification Assessment (Conditions 23 and 24) will be made public.

147. The Certificate Holder has and will continue to participate in the technical working groups convened by NYSERDA and related to offshore wind development, and through such technical working groups, engage the relevant stakeholder groups regarding the Project (in accordance with Section 12.04 of their OREC Agreement with NYSERDA). Environmental data will be made available in accordance with Section 12.07 of the OREC Agreement.

N. Onshore Erosion Control and Soil Handling

148. Prior to start of construction, the Certificate Holder shall install erosion and sediment control practices as indicated in any applicable EM&CP and any stormwater and erosion control plans. Installed erosion and sediment control practices shall be inspected daily and promptly repaired, where necessary in areas of active construction. In areas without active construction, where temporary stabilization measures have been applied to all disturbed areas, erosion and sediment control practices shall be inspected weekly and promptly repaired, where necessary, if permanent stabilization has not been achieved. All erosion and sediment control practices shall be designed and installed per the "New York State Standards and Specifications for Erosion and Sediment Control" and shall be inspected and maintained in accordance with the requirements of the SPDES General Permit currently in effect.

149. To the extent available, all erosion control fabric or netting used for slope or soil stabilization will be 100% biodegradable natural product (not photodegradable fabric), excluding geotextiles used for road construction and temporary erosion control devices such as silt fence and silt sock.

150. In all portions of the onshore Project Corridor where these measures may prove beneficial, topsoil shall be removed from the combined width of the subsoil stockpile area, trench, construction assembly and traffic zones. The depth of the topsoil removal shall include all of the "A" horizon down to the beginning of the subsoil "B" horizon, generally not to exceed a maximum of 12 inches. All topsoil shall be stockpiled separate from other excavated materials. The exposed surface of the subsoil shall be the work surface. All topsoil material shall be stripped, stockpiled, and returned in its natural sequence to restore the original soil profile. During the clearing/construction phase, site-specific depths of topsoil stripping shall be monitored by Certificate Holder. Where ROW construction includes cut-and-fill of the soil profile across grades, all topsoil shall be stripped and separately stockpiled, where practical, on the upslope edge of the ROW.

151. The Certificate Holder shall comply with the following debris and fill requirements:

a. Any debris or excess construction materials shall be removed to a facility duly authorized to receive such material. No burying or burning of construction debris or excess construction materials will be allowed.

b. Except where required to comply with the design specifications, to restore roadway and shoulder surfaces, and to reuse uncontaminated excavated materials, all fill shall consist of clean soil, sand and/or gravel that is free of the following substances: asphalt, slag, broken concrete, demolition debris, garbage, household

refuse, tires, woody materials including tree or landscape debris, and metal objects. Best efforts will be made use fill materials that are visually free of invasive species.

152. The Certificate Holder shall prepare a Geotechnical Site Investigation Report, to be included in the Phase 1 EM&CP, verifying subsurface conditions along the approved Onshore Transmission Cable corridor and characterizing subsurface conditions at sites where HDD is proposed.

O. Water Resources

153. Jurisdictional waterbodies and wetlands will be referred to herein as "wetlands and waterbodies" and the "appropriate adjacent areas" shall mean (i) the 100-foot adjacent area associated with State jurisdictional Article 24 Freshwater Wetlands, and (ii) the 300-foot (or less due to the presence of a qualifying structure[s] as defined by 6 NYCRR Part 66) adjacent area associated with State jurisdictional Article 25 Tidal Wetlands. When the terms are used together, they will be listed as "wetlands and waterbodies and/or appropriate adjacent areas."

a. Certificate Holder shall follow Appendix S to the Joint Proposal, Wetlands and Waterbodies Specifications.

154. Except as otherwise permitted in the Certificate or EM&CP, no construction activities shall occur within any wetlands and waterbodies, historic / extant / existing submerged aquatic vegetation beds, any Natural Protective Feature, and ponds or pools associated with the Carmans River watershed, and no construction materials, equipment, or vehicles shall be allowed to enter upon such wetlands and waterbodies and appropriate adjacent areas.

155. The Certificate Holder shall perform a pre-construction survey to determine the presence or absence of extant/existing SAV beds within the Project Corridor in the ICW and the footprint of the Equipment (see Condition 81). The plan and timing of this survey will be outlined in the Submerged Aquatic Vegetation Survey Plan, which shall be filed as part of the Post-Phase 1 EM&CP. The Certificate Holder shall provide the survey plan at least 45 days prior to filing the EM&CP to DPS Staff, NYSDOS, NYSDEC, and NYSAGM for review and comment. If extant/existing submerged aquatic vegetation beds are found during the survey or were found during the 2020 extant/existing SAV survey performed within the Project Corridor along the ICW HDD's route, that could be impacted by an HDD inadvertent return or use of the Equipment, the Certificate Holder shall develop a Submerged Aquatic Vegetation Monitoring and Minimization Plan that will be reviewed and agreed to with DPS Staff, NYSDOS, and NYSDEC. Such plan will be filed with the Secretary prior to the installation of the Equipment. If it is determined in consultation with NYSDEC and NYSDOS that extant/existing SAV will be taken during construction, the Certificate Holder will implement a SAV Restoration Plan

that will outline restoration of 3:1 for direct take and 1:1 for indirect impact. The SAV Restoration Plan, if necessary, shall be filed with the Secretary prior to the commencement of construction in the relevant area.

156. As will be detailed in the EM&CP, the Certificate Holder will first avoid and then minimize to the maximum extent practicable impacts to the Coastal Erosion Hazard Area (CEHA) regulated under ECL Article 34 and associated regulations in 6 NYCRR § 505. Unless otherwise authorized by the EM&CP, the HDD entry and exit will not be located within the CEHA.

157. As will be detailed in the EM&CP, the Certificate Holder will list the activities and anticipated timeframes proposed within each SCFWH and identify avoidance and minimization measures for the following:

a. significant concentrations of waterfowl during spring or fall migration and overwintering associated with the following SCFWHs: Great South Bay-East, Moriches Bay; and

b. overwintering and active nesting sites for raptors (e.g., peregrine falcon, northern harrier, osprey, Cooper's hawk) and nesting shorebirds associated with the following SCFWHs: Carmans River, Great South Bay-East, Moriches Bay, and Smith Point County Park.

158. The Certificate Holder shall perform all construction, operation, and maintenance along the Onshore Transmission Cable in a manner that first avoids and then minimizes, to the maximum extent practicable, adverse impacts to wetlands and waterbodies and appropriate adjacent areas. If wetlands and waterbodies cannot be fully avoided, any such activities shall be performed in accordance with a Wetland Impact Minimization and Mitigation Plan to be included in any applicable EM&CP. Forty-five days prior to filing the EM&CP, the Certificate Holder shall submit the Wetland Impact Minimization and Mitigation Plan to DPS Staff, NYSDEC, and NYSDOS for review and comment.

159. Unless otherwise approved in the Certificate or EM&CP, the Onshore Transmission Cable shall be installed using trenchless methods when traversing all wetland and waterbodies.

160. The Certificate Holder shall notify DPS Staff and NYSDEC via telephone within two hours if there is a discharge to a wetland or waterbody resulting in a violation of NYS Water Quality Standards. A written description provided via email of the discharge, photographs, and a summary of remedial activities, shall be provided to DPS Staff and NYSDEC within 24 hours of such discharge.

161. The Certificate Holder shall take all necessary precautions to preclude contamination of any wetland or waterbody by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate, washings from transit mix trucks, mixers, or other devices or any other environmentally deleterious materials associated with the Project. If required, concrete batch plant operations and concrete washout areas shall be located a minimum of 300 feet away from any wetland or waterbody.

    a. If concrete batch plant operation(s) are required, the location(s), site plans and appropriate measures for avoiding adverse impacts, restoring sites upon project completion, and complying with local code requirements will be included in the EM&CP.

162. The Certificate Holder shall secure and safely contain all equipment and machinery outside of wetlands and waterbodies, at the end of each work day, unless moving the equipment will cause additional environmental impact.

163. Fueling of equipment and storage of fuel or other chemicals is strictly prohibited within tidal wetlands and within 100 feet of the tidal wetland boundary. Fueling and storage areas within 300 feet of any tidal wetland and/or within the New York State Coastal Area as defined within NYS Executive Law § 911(1) and (2) must be delineated in the EM&CP and contained by strawbales or other approved containment devices (*i.e.*, containing at least 110% of the volume stored) to prevent spills from entering tidal wetlands and/or waterways. Should a spill occur, the permittee shall immediately notify the Regional Marine Habitat Protection Office at 631-444-0295, the NYSDEC Spill Hotline at 800-457-7362, and shall provide a plan for containment, clean-up and restoration of the impacted area for the approval of the department. No refueling is authorized on the beach.

    a. Dewatering pumps operated within the adjacent areas as defined in Condition 68, must be within secondary containment large enough to hold the pump and accommodate refueling.

164. The Certificate Holder shall comply with the following conditions for all dewatering operations:

    a. dewatering operations shall discharge into a dewatering device delineated in the Certificate Holder's Dewatering Plan (i.e., temporary straw bale/silt fence barrier, filter bag, frac tanks or similar containers);

    b. water generated from groundwater dewatering operations that exceeds NYSDEC standards, criteria, or guidance values, or more stringent applicable levels of other

authorities or agencies in effect at the time of dewatering operations must be treated and/or disposed of in compliance with the approved Dewatering Plan;

c. one round of groundwater baseline sampling will occur prior to the start of construction at locations where excavations are anticipated to extend below the groundwater table (such as at trenchless crossings locations) to identify potential groundwater contamination that may require testing, treatment, or disposal during construction. The testing, treatment, and/or disposal practices, as necessary, will be addressed in the Certificate Holder's Dewatering Plan;

d. best management practices shall be used to prevent erosion and sedimentation from discharge operations; and

e. water resulting from dewatering operations, equipment washing, or other construction related activities shall not be directly discharged into any wetland or waterbody.

165. All sampling, disposal, and construction activities must be performed in a manner consistent with NYSDEC standards, criteria, or guidance in effect at the time of such activities.

166. The Certificate Holder shall inform the USACE and NYSDOS of any changes in the design of the Project that have the potential to impact any USACE-issued permit or authorization and shall file a copy of such correspondence with the Secretary.

167. If there are impacts to freshwater wetlands or associated wetland adjacent areas, those areas shall be stabilized within 48 hours of final backfilling of the trench and restored to pre-construction contours as soon as practicable, but no later than 14 days of final backfilling. Immediately upon completion of grading, and as consistent with existing land uses, the area shall be seeded with a seed mix of native plants specified in the approved EM&CP that is appropriate for wetlands and upland areas adjacent to wetlands. Overall vegetative cover in restored areas shall be monitored for a minimum of 5 years or until an 80% cover of plants with the appropriate wetland or upland plants (as appropriate) has been reestablished over all portions of the restored area. Invasive species growth in the restored areas shall be monitored for a minimum of 5 years. The proportion of invasive species in the freshwater wetlands and adjacent areas cannot exceed the proportion that existed immediately prior to the start of construction as described in the baseline invasive species survey. If, after one complete growing season, the 80% cover requirement has not been established or the proportion of invasive species has increased, the Certificate Holder shall consult with NYSDEC and prepare a Wetland Planting Remedial Plan (WPRP) in accordance with the approved EM&CP and shall submit the WPRP to NYSDEC and DPS for acceptance prior to implementation.

P. Cultural Resources

168. The Certificate Holder shall implement the following cultural resources avoidance, minimization, and mitigation measures, as determined in consultation with the OPRHP:

a. The Certificate Holder shall not undertake construction in previously undisturbed areas where archeological surveys have not been completed until such time as the appropriate authorities, including OPRHP, and DPS Staff, have reviewed the results of any historic properties and archeological surveys that are required.

b. The Certificate Holder shall indicate in any applicable EM&CP or equivalent documents, measures for avoidance of archeological sites identified within the Project Corridor, if applicable. The mapped locations of all identified archeological sites within the Project Corridor shall be identified as "Environmentally Sensitive Areas" or similar on the final construction drawings and onshore (terrestrial) archeological sites will be marked in the field to restrict access.

c. A Final Cultural Resources Mitigation Plan, as applicable, either as adopted by a federal permitting agency in subsequent National Historic Preservation Act (NHPA) §106 or National Environmental Policy Act (NEPA) substitution for §106 review, or as revised in further consultation with New York State Historic Preservation Office (SHPO) in the event that the NHPA §106 or NEPA substitution for §106 review does not require that the mitigation plan be implemented, or as further supplemented pending any negotiations among parties. Proof of mitigation funding awards for offsetting Project implementation impacts to significant cultural resources to be provided within 2 years of the start of construction of the Facility shall be included.

169. The following conditions apply to the discovery of unanticipated archaeological materials:

a. If unanticipated archeological discoveries occur during onshore construction, and continuing construction in the immediate vicinity (150 feet) would be incompatible with the objective of preserving the quality and integrity of the resource, the Certificate Holder shall stabilize the area and cease all ground-disturbing activities in the immediate vicinity (150 feet) of the find and protect the find from further damage. The restricted areas would extend from the maximum discernable limit of the archaeological resource. The only earth-moving activities that may occur within the restricted areas prior to notifications are those necessary for immediate stabilization of the exposed archaeological feature or deposit. The Certificate

Holder shall flag, fence off, or securely cover with steel plates the archaeological discovery location and take reasonable measures to ensure site security.

b. If unanticipated archaeological discoveries occur during offshore construction, the Certificate Holder shall stop work in the immediate vicinity (within 150 feet) of the find and consult a qualified marine archaeologist to assist in determining the origin of any finds and immediate measures, if appropriate and feasible, to stabilize the archaeological resource. The avoidance distance would extend from the maximum discernible extent of the archaeological resource.

c. Within 24 hours of such onshore or offshore discovery, the Certificate Holder shall notify and consult with DPS Staff and OPRHP to determine the best course of action. Any discovery made on a weekend will be protected until DPS Staff and OPRHP are notified of the discovery. No construction activities shall be permitted in the vicinity of the find until such time as the significance of the resource has been evaluated by OPRHP and the need for and scope of impact mitigation has been determined by DPS Staff in consultation with OPRHP and the Certificate Holder. The Certificate Holder may engage qualified archaeologists to assist in preliminary visual assessments and documentation, consultations with OPRHP and DPS Staff, and development of appropriate treatment/mitigation measures.

170. Should human remains or evidence of human burials be encountered during the conduct of archeological data recovery fieldwork or during construction, all work in the vicinity of the find shall be halted immediately for the remains to be protected from further disturbance. Immediately upon any such discovery, the Certificate Holder shall notify and consult with DPS Staff and OPRHP. The Certificate Holder shall ensure that treatment of human remains is done in accordance with the OPRHP's Human Remains Discovery Protocol (dated August 2018).

171. The Certificate Holder shall ensure that all archaeological or human remains-related encounters and their handling are reported in the status reports summarizing construction activities.

Q. Terrestrial and Wildlife Resources

172. The Certificate Holder shall refer to 6 NYCRR Part 182 and http://www.dec.ny.gov/animals/7494.html for lists of T&E animal species and to 6 NYCRR Part 193 for T&E plant species. Prior to the commencement of construction of the Onshore Transmission Cable, the Certificate Holder will provide all workers with pertinent information on potential T&E species in the Project Corridor.

173. If any T&E animal or plant species are observed from the Project Corridor, access roads, laydown yards, and any other areas where Project activities authorized in this Certificate are conducted, the Certificate Holder shall immediately notify the environmental monitor to determine the appropriate actions, if any, to protect the identified species, or its occupied habitat, from immediate harm, and shall also notify DPS Staff and NYSDEC within 24 hours.

174. If any work results in or is likely to result in an incidental take of an Endangered or Threatened species as defined in 6 NYCRR Part 182, the Certificate Holder must stop work where the take occurred or is likely to occur (Stop Work Area) and must submit an Endangered or Threatened Species Mitigation Plan and Implementation Agreement (T&E Plan/Agreement) demonstrating proposed mitigation measures that will result in a Net Conservation Benefit to that species. Such T&E Plan/Agreement must be prepared in accordance with the requirements of 6 NYCRR Part 182, and developed in consultation with and accepted by NYSDEC and DPS Staff. Work must not recommence in the Stop Work Area until the T&E Plan/Agreement is accepted by NYSDEC and such T&E Plan/Agreement is implemented.

175. Certificate Holder will develop and include as part of the Phase 1 EM&CP an Avian Management Plan for rare, threatened, and endangered ("RTE") avian species in consultation with the appropriate regulatory agencies, including the NYSDEC, to address residual risk to these species.

R. Invasive Species

176. The Certificate Holder shall prepare an Invasive Species Control and Management Plan in accordance with the applicable requirements of ECL Article 9 and 6 NYCRR Part 575 and 6 NYCRR Part 663 as outlined in the Invasive Species Management Plan Specifications in Appendix P of the Joint Proposal. Forty-five days prior to filing the Phase 1 EM&CP, the Certificate Holder shall submit the Invasive Species Control and Management Plan for DPS Staff review and comment in consultation with NYSDEC. The Certificate Holder shall file said Invasive Species Control and Management Plan as part of the EM&CP.

177. To minimize the risk of introducing invasive species, use of hay is strictly prohibited.

S. Marine Resources

178. The Certificate Holder must comply with applicable federal agencies' requirements for noise mitigation for protected species in NYS waters as required in the federal COP approval, USACE permits, and Incidental Take Authorization issued for this Project.

179. The Certificate Holder must comply with applicable federal agencies' requirements for protected species mitigation, monitoring and reporting as detailed in the federal COP approval, Incidental Take Authorization, and other federal permits/approvals issued for this project. All protected species reports submitted to BOEM and NOAA involving NYS waters will be copied to NYSDEC.

180. Sightings of North Atlantic Right whales must be reported to NOAA within 24 hours.

T. Water Quality

181. Water quality standards set forth in 6 NYCRR Parts 701, 702, 703 and 704, and sections 301, 302, 303, 306, and 307 of the federal Clean Water Act (*see* 33 USC §§ 1311, 1312, 1313, 1313a, and 1317) shall not be contravened. Issuance of a Water Quality Certification also implies compliance with standards assuming that conditions placed in the certification are complied with.

a. Water Quality Standard: None from sewage, industrial waste or other wastes that will cause deposition or impair the waters for their best usages.

182. The Certificate Holder shall incorporate within the Post-Phase 1 EM&CP and implement a Suspended Sediment and Water Quality Monitoring Plan pertaining to offshore and onshore activities. The Certificate Holder must submit a Suspended Sediment and Water Quality Monitoring Plan for review and comment by DPS Staff, NYSDEC, and NYSDOS forty-five (45) days prior to the filing of the EM&CP. The Suspended Sediment and Water Quality Monitoring Plan must be prepared in accordance with Appendix I of the Joint Proposal.

a. Water quality monitoring shall be conducted within the Project Corridor as described in Appendix B during seabed preparations, jet trenching pre-construction and construction activities, excavation of the HDD exit, pre-lay grapnel run, cable installation, backfill of the HDD exit, and maintenance and decommissioning activities that involve disturbance of sediments (together, "Monitored Construction Activities").

b. Maintenance and decommissioning activities that result in only minor disturbance of sediments, including: (i) anchor sweep; (ii) anchoring; (iii) placement of jack-up barge; (iv) hand jetting; or (vi) other activities as determined by DPS Staff, in consultation with NYSDEC, shall not require water quality monitoring.

183. The Suspended Sediment and Water Quality Monitoring Plan must:

a. Specify sample location, depth of samples, frequency of sampling, and sampling during various tidal cycles;

b. Describe procedures for background (upcurrent) and compliance (downcurrent) monitoring;

c. Include daily sampling during each tidal cycle;

d. Use an Acoustic Doppler Current Profiler to locate the plume;

e. Require whole water samples in the vertical water column (from at least 3 depths) along a transect within the plume;

f. Include an up-current transect outside the influence of Monitored Construction Activities;

g. Require water quality monitoring, which shall include laboratory TSS and OBS turbidity analyses, to be conducted daily throughout the duration of Monitored Construction Activities. Prior to commencing maintenance and decommissioning activities, the Certificate Holder shall submit for NYSDEC review a water quality monitoring plan for activities that may require such monitoring;

h. Identify a procedure whereby, if sampling results indicate consistent compliance with the TSS standards, the Certificate Holder can submit a request in writing to DPS Staff and NYSDEC to reduce the sampling frequency;

i. Specify that real-time data must be collected using Acoustic Doppler Current Profiler and Optical Backscatter Sensor instrumentation and by collecting water samples at various depths for laboratory analysis of: TSS according to the methods and method detection limits identified in the Water Quality Monitoring Plan;

j. Specify that, if activities occur concurrently in multiple locations, each activity that may cause resuspension of bottom sediments must be monitored separately.

184. All water quality analyses required by this Certificate must be conducted by a laboratory certified by the NYSDOH ELAP.

185. Certificate Holder shall use commercially reasonable efforts to request the most expedited turnaround time available for laboratory samples for locations along the SRWEC-NYS.

Analytical results must be sent to DPS Staff and NYSDEC as soon as received from the laboratory, but no longer than forty-eight (48) hours of receipt. Exceedances must be highlighted.

186. A pre-activity water quality calibration will be conducted to ensure that TSS may be accurately estimated in real-time during water quality monitoring activities. The pre-activity water quality calibration will be described in detail in the suspended solids and water quality monitoring plan.

187. The following limit must be achieved for TSS at a distance of 1,500 feet down current (based on tide direction) of sediment disturbing activities:

a. Guidance Value: TSS 100 mg/L above ambient for all offshore construction activities.

b. If during water quality monitoring, the real-time TSS concentrations established by the calibration curve exceed the TSS limits established in this Certificate, DPS Staff, NYSDEC Staff, and the Aquatic Environmental Monitor shall be immediately notified and work shall be ceased immediately and then restarted at modified levels that will reduce TSS levels and bring them into compliance with Condition 192 (a) (b) in accordance with iterative changes outlined in Condition 192 (c) (ii) and (iii). The Certificate Holder will continue to iteratively implement operational controls and measure the resulting TSS. The Certificate Holder will notify the Aquatic Monitor throughout the process about any such operational adjustments.

i. During implementation of corrective actions, DPS Staff and NYSDEC may specify additional monitoring until compliance with Water Quality Standards is demonstrated. Samples shall be collected until resumption of routine monitoring is authorized by DPS Staff in consultation with NYSDEC.

ii. For purposes of iterative changes to the use of a CFE or hand jetting tools, the following changes may be employed: changing the rate of advancement of the CFE or hand jet tool, modifying or varying hydraulic jetting pressures, and/or implementing other reasonable operational controls that may reduce suspension of in-situ sediments in a manner that would not materially delay the progress of work to complete the installation procedure.

iii. For purposes of iterative changes to the use of a barge mounted excavator, the following changes may be employed: changing the rate of advancement of the excavator, modifying the depth of the excavator bucket in the water column, implementing other reasonable operational controls that may reduce suspension of in-situ sediments in a manner that would not materially delay the progress of work to complete the installation procedure, and/or operating the bucket so as to control the rate of the descent and to maximize the depth of penetration without overfilling the bucket, and/or to control bucket retrieval rates.

188. If any jet trenching technology is used to lay the cable, trials must be conducted within representative sections or areas proximate to the proposed underwater cable route in NYS waters prior to cable installation to ensure compliance with Total Suspended Solids ("TSS") threshold limits as defined in Condition 187 (a). The trial will include approximately 1,000 feet of jet trenching operations within an area to be specified in the Jet Trencher Trial Plan that will be submitted as part of the Post-Phase 1 EM&CP. The following conditions apply to jet trencher trials:

a. Pre-monitoring water quality calibration will be conducted prior to the jet trencher trails and will enable real-time estimation of TSS concentrations during the trials.

b. A combination of acoustic ("ADCP") and calibrated optical backscatter ("OBS") measurements will be used to estimate TSS concentrations on selected transects. TSS and OBS turbidity water samples will be collected one thousand five hundred (1,500) feet up-current (for baseline) and one thousand five hundred (1,500) feet down-current of the jet plow, at three-interval depths (near surface, mid-depth, and near bottom) and analyzed by a NYSDOH Environmental Laboratory Approval Program ("ELAP") certified laboratory. Water quality monitoring requirements during jet trencher trials will be described in detail in the suspended solids and water quality monitoring plan;

c. The Certificate Holder must coordinate with DPS Staff and NYSDEC to share real-time TSS measurement estimates collected during the jet trencher installation trials to evaluate whether the operating conditions result in TSS concentrations that exceed the TSS threshold limit;

d. If the jet trencher trials demonstrate that the operating conditions result in TSS concentrations that exceed the TSS threshold limit established herein, the Certificate Holder notify DPS Staff and NYSDEC and implement feasible

modifications to the jet trencher operating conditions to further reduce in-situ sediment re-suspension associated with the jet trencher installation procedure; and

e. Jet trencher operations may proceed after Jet Trencher Trial results are reviewed in real-time and accepted by DPS Staff and NYSDEC. Review of this information by DPS and NYSDEC staffs shall not unreasonably delay the commencement of installation of the underwater cable system.

189. The following conditions apply if jet trenching technology is used to install the SRWEC–NYS:

a. The Certificate Holder must operate the jet trencher in accordance with the operating conditions determined through jet trencher trials to maintain the suspension of in-situ sediments within the Total Suspended Solid (TSS) limits;

b. If, during jet trencher installation of the cable, TSS concentrations exceed the TSS limits established in this Certificate, the Certificate Holder shall follow the process established in Conditions 188 and 189 (c).

c. For purposes of iterative changes to the use of the jet trencher, the following changes may be employed: changing the rate of advancement of the jet trencher, modifying or varying hydraulic jetting pressures, and/or implementing other reasonable operational controls that may reduce suspension of in-situ sediments in a manner that would not materially delay the progress of work to complete the jet trencher installation procedure.

190. The offshore conduit end of the SRWEC–NYS may be exposed or buried by means of hydraulic or mechanical dredging. Material needed for cover of the Landfall HDD conduit end will be placed adjacent to the Landfall HDD conduit location for later use as cover material. Material placement will be done to minimize the footprint of the reverse backfill material and the Certificate Holder will minimize the sediment removed from the offshore HDD exit to the maximum extent practicable. If material to be dredged is contaminated, prior to dredging, the Certificate Holder shall identify the final dredged material disposal location, including a letter from the permitted disposal facility verifying that they will accept the material.

a. All contaminated material shall be handled in accordance with details provided in the EM&CP and below:

i. only use equipment in good operating condition;

ii. not use deck barges, unless modified to allow no barge overflow and as approved by the Environmental Monitor and DPS Staff in consultation with NYSDEC;

iii. use barges or scows of solid hull construction or which are sealed;

iv. use a closed (i.e., sealed) environmental (e.g., clamshell) bucket with sealing gaskets or an overlapping sealed design at the jaws and seals or flaps positioned at locations of vent openings to minimize sediment suspension;

v. ensure that seals or flaps designed or installed at the jaws and locations of vent openings tightly cover these openings while the bucket is lifted through the water column and into the barge;

vi. equip the closed environmental (e.g., clamshell) bucket with sensors to ensure complete closure of the bucket before lifting through the water;

vii. operate the bucket so as to control the rate of the descent and to maximize the depth of penetration without overfilling the bucket;

viii. control bucket retrieval rates to minimize turbidity;

ix. lower the bucket to the level of the barge gunwales prior to release of the load and place the excavated material deliberately and in a controlled manner;

x. suspend operations until any necessary repairs or replacements are made when a significant loss of water and visible sediments from the bucket is observed;

xi. avoid washing the gunwales of the scow except to the extent necessary to ensure the safety of workers;

xii. not overflow the barge; and

xiii. The Certificate Holder shall allow a minimum twenty-four (24) hours of settlement prior to decanting barges. Decanting of barges may not commence until approved by DPS Staff, in consultation with NYSDEC;

xiv. operate the equipment so as to minimize sediment transport.

191. The Certificate Holder will perform a focused benthic study designed to investigate benthic recovery following completion of construction at the offshore HDD exit. The scope of that study is outlined in Appendix Q.

192. The following conditions shall be applied to minimize sediment released into the water column during the Landfall HDD conduit installation:

a. The environmental monitor shall inspect all installation equipment to be utilized at the offshore HDD exit prior to use and shall perform periodic inspections of all such equipment no less than once per week when in use.

b. The Certificate Holder shall:

i. only use equipment in good operating condition;

ii. only use equipment fit for purpose;

iii. operate the equipment to satisfy TSS guidance value described in Condition 187;

iv. not use a dragline for excavation;

v. demonstrate to the environmental monitor that the equipment operator has sufficient control over the bucket operation so that the sediment re-suspension from bucket contact with the bottom and bucket over-filling is minimized;

vi. utilize bucket excavation unless bucket excavation would endanger the HDD borehole, in which case the Certificate Holder may use airlift, controlled flow excavation, and/or suction dredging methodologies to install the HDD conduit and the SRWEC-NYS cable; and

vii. during excavation and backfill of at the offshore HDD exit pit, provide to DPS Staff, NYSDEC, NYSDOS weekly progress reports that demonstrate compliance with Certificate requirements and such other information as determined necessary based on consultation with DPS Staff, NYSDEC, and NYSDOS.

c. Certificate Holder may install permanent concrete mattresses or rock bags for protection of the conduit and/or cable within the offshore HDD exit, provided that the Certificate Holder shall cover such protection measures with at least three feet of material excavated from the HDD exit or similar material from upland sources and ensure that there is no discernible depression consistent with Condition 192 (d). Additional details regarding such cable protection measures shall be provided in the EM&CP. Prior to filing the Post-Phase 1 EM&CP, Certificate Holder shall consult with DPS Staff, NYSDEC, and NYSDOS regarding cable protection measures.

d. No later than three months following the COD, exclusive of the construction windows described herein, Certificate Holder shall determine whether there is a discernible depression at the offshore HDD exit. If there is a discernable depression, the Certificate Holder will timely backfill the HDD exit unless, in consultation with DPS Staff and NYSDEC, it is determined backfill is not necessary.

193. Visual observations of turbidity will be identified in the Post-Phase 1 EM&CP caused by underwater cable and HDD exit pit installation/backfill activities, pre-lay grapnel run operations, maintenance, and decommissioning activities must be conducted to ensure compliance with the narrative water quality standard in 6 NYCRR § 703.2: "No increase that will cause a substantial visible contrast to natural conditions."

194. If an HDD exit pit is utilized, within four months of Commercial Operation, the Certificate Holder must submit a report summarizing the results of the construction of the offshore HDD exit, water quality monitoring, and excavated material management operations. The report shall include:

a. location and extent of excavation;

b. total amount of material excavated;

c. ultimate placement location of excavated material;

d. water quality monitoring results and corrective actions (when needed) taken; and

e. documentation of follow-up testing/observations.

195. Within four months of completion of the excavation of the offshore HDD exit, the Certificate Holder must file with the Secretary an analysis comparing the actual water quality monitoring results obtained during installation with any model predictions previously provided in support of the Project.

196. Certificate Holder shall comply with any conditions contained in a Water Quality Certification issued pursuant to Section 401 of the Federal Clean Water Act, a draft of which is set forth in Appendix F.

U. Handling of Petroleum & Hazardous Substances

197. Uncontaminated drill cuttings and drilling muds from drilling processes which utilize only air, water, or water-based drilling fluids are considered construction and demolition debris under 6 NYCRR Part 360 (Solid Waste) and can be disposed of at either construction and demolition debris landfills or at municipal solid waste (MSW) landfills. Drill cuttings from drilling processes which utilize polymer-based mud containing mineral oil lubricant are considered contaminated and can only be disposed of at MSW landfills. Dewatered drilling muds including polymer-based mud containing mineral oil lubricant can only be disposed of at MSW landfills.

198. Chemicals and petroleum products will not be stored, mixed, or loaded, nor will equipment be refueled, within 300 feet of wetlands and waterbodies and/or within the New York State Coastal Area as defined within NYS Executive Law § 911 (1) and (2), unless otherwise authorized by any EM&CP. Requirements for refueling within 100 feet of wetlands and waterbodies will be allowed in the circumstances outlined below or as otherwise authorized by the EM&CP.

a. Refueling of hand equipment will be allowed within 100 feet of wetlands or waterbodies when secondary containment is used. Secondary containment will be constructed of an impervious material capable of holding the hand equipment to be refueled and at least 110% of the fuel storage container capacity. Fuel tanks of handheld equipment will be initially filled in an upland location greater than 100 feet from wetlands or waterbodies in order to minimize the amount of refueling within these sensitive areas. Crews will have sufficient spill containment equipment on hand at the secondary containment location to provide prompt control and cleanup in the event of a release. If a dewatering pump is operated closer than 100 feet from the wetlands or waterbody, or within 300 feet from tidal wetlands, it must be within secondary containment large enough to hold the pump and accommodate refueling.

b. Refueling of equipment will be allowed within 100 feet of wetlands or waterbodies when necessary to maintain continuous operations and where removing equipment from a sensitive area for refueling would increase adverse impacts to the sensitive area. Fuel tanks of such equipment will be initially filled in an upland location greater than 100 feet from wetlands or waterbodies in order to minimize the amount

of refueling within these sensitive areas. All refueling of equipment within 100 feet of wetlands or waterbodies will be conducted under the direct supervision of the environmental monitor. Absorbent pads or portable basins will be deployed under the refueling operation. In addition, the fuel nozzle will be wrapped in an absorbent pad and the nozzle will be placed in a secondary containment vessel (e.g., bucket) when moving the nozzle from the fuel truck to the equipment to be refueled. All equipment operating within 100 feet of a wetland or waterbody will have sufficient spill containment equipment on board to provide prompt control and cleanup in the event of a release.

199. The Certificate Holder shall comply with the following spill requirements:

a. A Spill Prevention, Control, and Countermeasure (SPCC) Plan to minimize the potential for unintended releases of petroleum and other hazardous chemicals during Project construction and operation shall be included in each applicable EM&CP;

b. All non-passenger vehicles must be equipped with spill kits containing a variety of sorbents for small to large releases. Spill kits will be on hand during all refueling operations. Any leaks will be stopped and cleaned up immediately;

c. Spillage of fuels, waste oils, other petroleum products or hazardous materials shall be reported to NYSDEC's Spill Hotline (1-800-457-7362) within two hours, in accordance with the NYSDEC Spill Reporting and Initial Notification Requirements Technical Field Guidance (http://www.dec.ny.gov/docs/remediation_hudson_pdf/1x1.pdf); and

d. The Certificate Holder shall report all spills encountered, regardless of whether it is the spiller, to both the NYSDEC Spill Hotline and DPS Staff, in accordance with all federal and State regulations, and provide a copy of such notification contemporaneously to the affected property owner. The Certificate Holder acknowledges that neither the Town nor NYSDOT will undertake or accept financial responsibility for any remediation or similar activity with respect to the removal of hazardous wastes (6 NYCRR Parts 373 and 374) and non-hazardous solid industrial wastes (6 NYCRR Part 360) for any such spills caused by Certificate Holder or its contractors.

V. Vegetation Management and Herbicide, Fungicide, and Pesticide Use

200. The Certificate Holder shall prepare a Vegetation Management Plan as part of the Phase 1 EM&CP. Forty-five days prior to filing the EM&CP, the Certificate Holder shall submit the Vegetation Management Plan to DPS Staff and NYSDEC for review and comment.

201. The Certificate Holder shall take appropriate measures, as outlined in the Vegetation Management Plan to minimize tree clearing, install tree protection fencing around critical root zone, and minimize soil compaction within temporary work areas that will be revegetated post-construction, including but not limited to work areas within SCFWHs, open space, parkland, and wetlands and waterbodies.

202. Certificate Holder shall only use the pesticides, fungicides, and herbicides specified in the EM&CP. If the Certificate Holder desires a change to the pesticides, herbicides, and fungicides specified in the EM&CP, including mix proportions, additives (with the exception of dyes), or method of application, the Certificate Holder shall submit the proposed change for approval pursuant to Condition 41. The Certificate Holder will not use pesticides, fungicides, or herbicides in wetlands and waterbodies or appropriate adjacent areas. In the event pesticides, fungicides, or herbicides are required in wetlands and waterbodies or appropriate adjacent and no general permit from the NYSDEC is available, the Certificate Holder shall secure the necessary permits from NYSDEC.

203. The supervising applicator shall be certified in accordance with all applicable NYS laws and shall be familiar with and understand the applicable provisions of this Certificate and the most recent version of the Certificate Holder's Vegetation Management Plan.

204. The Certificate Holder shall coordinate with LIPA and/or PSEG Long Island as to vegetation clearing required for the Project in the vicinity of existing transmission and distribution lines and substations.

205. Unless described otherwise in the EM&CP, all trees over four inches in diameter (measured four feet above ground) or shrubs over four feet in height that are damaged or destroyed by the Certificate Holder's activities during construction, operation, or maintenance, (excluding any trimming of limbs or branches required to maintain safe work clearances) regardless of where located, shall be replaced by the Certificate Holder with the equivalent type trees or shrubs, subject to the provisions of 6 NYCRR Part 575, Prohibited and Regulated Invasive Species, except where:

    a. equivalent-type replacement trees or shrubs would interfere with the proper clearing, construction, operation, or maintenance of the Project;

b. replacement would be contrary to sound ROW management practices or to any approved Vegetation Management Plan applicable to the Project; or

c. a property owner on whose land the damaged or destroyed trees or shrubs were located provides a written statement declining replacement (or other recorded easement or license holder with the right to control replacement declines replacement).

206. Clearing of natural vegetation shall be limited to the Commission-accepted Vegetation Management Plan and vegetation that poses a hazard or hindrance to construction activity and/or operation.

207. The Certificate Holder shall develop a Vegetation Restoration Plan, to be submitted as part of the Phase 1 EM&CP, that governs the off-roadway, onshore portion of the Project Corridor. The Vegetation Restoration Plan shall cover the following information:

a. The restoration (*i.e.*, soil stabilization, seeding, planting) to be undertaken immediately following completion of construction and any post-construction assessment;

b. Specify the necessary planting density, if any, to minimize invasive species encroachment; and

c. Identify any existing forested areas, if any, that would be cleared during construction and required to be maintained post-construction to prevent reforestation.

W. Restoration Activities

208. Unless otherwise specified in the EM&CP, Certificate Holder shall let the temporary construction area revegetate naturally or return to its original land use to the extent that it does not interfere with the inspection, operation, or maintenance of the utility facilities. The Certificate Holder will replant or reseed any existing vegetated areas of parkland and beach/dunes that are disturbed during construction. Except where otherwise specified in the EM&CP, stem-specific removal of trees or side trimming shall be conducted in accordance with long-range ROW management plans, real property rights; and provisions of any and all host community agreements, easements, leases, and/or license agreements.

X. Decommissioning

209. The Certificate Holder shall prepare a Primary Decommissioning Plan based on the final design of the Project, for inclusion in the Post-Phase 1 EM&CP. Certificate Holder shall provide the Primary Decommissioning Plan to DPS Staff, NYSDEC, New York State Office of General Services (NYSOGS), NYSDOT, NYSAGM, NYSDOS, and LICFA at least 45 days prior to filing the Post-Phase 1 EM&CP for review and comment. The Primary Decommissioning Plan shall include: (i) the anticipated life of the Project; (ii) estimates of the decommissioning costs (in current dollars; scrap and re-sale value cannot be used for offsetting of decommissioning costs) for the Project broken down by the component parts outlined in Condition 209 (a) (together, the Decommissioning Cost Estimate); (iii) the letters of credit or performance bond with surety available for decommissioning and restoration valued at the Decommissioning Cost Estimate; and (iv) procedures and timeframes for notifying landowners along the route about decommissioning activities. An outline of the Primary Decommissioning Plan is attached as Appendix R to the Joint Proposal.

a. For decommissioning purposes, the Project has four components:

   i. that portion of the SRWEC–NYS from the boundary of New York State territorial waters to the MHWL (the New York State Area Under the Jurisdiction of NYSOGS);

   ii. that portion of the SRWEC-NYS from the MHWL to the Landfall Work Area, the Onshore Transmission Cable, the OnCS–DC, and the Holbrook Expansion Area (together, the Onshore Transmission Facilities) under the jurisdiction of the NYSDOT (the New York State Area Under the Jurisdiction of NYSDOT)

   iii. that portion of the Onshore Transmission Facilities under the jurisdiction of the County (the County Local Area); and

   iv. that portion of the Onshore Transmission Facilities under the jurisdiction of the Town (the Town Local Area).

b. The Decommissioning Cost Estimate contained in the Primary Decommissioning Plan shall be updated based on the as-built Project, to reflect inflation, and any other increases due to labor or other costs, by a qualified independent engineer licensed in the State of New York, after one year of Project operation, and every fifth year thereafter. Such updates shall be filed (one year after commercial operation date and every fifth year thereafter), with the Secretary to the Commission. Scrap and re-sale value cannot be used for offsetting of decommissioning costs in the required estimate

updates. The value of the letters of credit secured for decommissioning purposes shall never be reduced below the initial Decommissioning Cost Estimate.

c. The Certificate Holder shall work with DPS Staff and/or the NYSOGS to craft a letter of credit that would establish a right for NYSOGS to draw on an irrevocable letter of credit in the event of the Certificate Holder's failure to timely decommission the facilities located in the New York State Area Under the Jurisdiction of NYSOGS and restore that area in accordance with the Primary Decommissioning Plan (the New York State OGS Area Letter of Credit). The New York State OGS Area Letter of Credit shall state on its face that it is held by and for the sole benefit of NYSOGS. Similarly, the Certificate Holder shall work with DPS Staff and/or the NYSDOT to obtain a performance bond with surety in the event of the Certificate Holder's failure to timely decommission the facilities located in the New York State Area Under the Jurisdiction of NYSDOT and restore that area in accordance with the Primary Decommissioning Plan (the New York State DOT Performance Bond with Surety). The New York State DOT Performance Bond with Surety shall state on its face that it is held by and for the sole benefit of NYSDOT.

    i. In the event either NYSOGS or NYSDOT refuses to or cannot be the beneficiary of the respective security, the Certificate Holder will work with NYSOGS and/or NYSDOT to establish an appropriate trust agreement with a third-party trustee that will hold the New York State OGS Area Letter of Credit and/or New York State DOT Performance Bond with Surety for the benefit of NYSOGS and/or NYSDOT to be funded in the appropriate amount pursuant to the Decommissioning Cost Estimate pursuant to the Commission's relevant order in this proceeding.

    ii. Prior to the commencement of construction, the Certificate Holder shall submit to the Secretary to the Commission proof that both the New York State OGS Area Letter of Credit and New York State DOT Performance Bond with Surety have been obtained in the amount of the Decommissioning Cost Estimate as calculated pursuant to the Commission's relevant order in this proceeding. Both the letter of credit and performance bond with surety shall remain in place for the life of the Project, until it is decommissioned.

d. The Certificate Holder will secure letters of credit to be held by the Town and County, respectively, that would establish rights for the Town and County to draw on said security in the event of the Certificate Holder's failure to timely decommission the facilities located in the Town Local Area (the Town Letter of Credit) or the County Local Area (the County Letter of Credit) and restore those areas in accordance with the

Primary Decommissioning Plan. The Town Letter of Credit will be held for the sole benefit of the Town and the County Letter of Credit will be held for the sole benefit of the County, and be, at a minimum, in the amount of the Decommissioning Cost Estimate as calculated pursuant to the Commission's relevant order in this proceeding.

i. In the event the Town and/or County ultimately refuses to be the beneficiary of such security, the Certificate Holder will work with DPS Staff to establish an appropriate trust agreement with a third-party trustee that will hold the relevant letter(s) of credit funded for the benefit of the Town and/or County, at a minimum, in the amount of the Decommissioning Cost Estimate as calculated pursuant to the Commission's relevant order in this proceeding.

ii. Prior to the commencement of construction, the Certificate Holder shall submit to the Secretary to the Commission proof that both the Town Letter of Credit and County Letter of Credit have been obtained in the amount of the Decommissioning Cost Estimate as calculated pursuant to the Commission's relevant order in this proceeding. Both letters of credit shall remain in place for the life of the Project, until it is decommissioned

e. Certificate Holder shall, if appropriate, engage the services of a trustee and enter into trust agreements for the administration of the funds from any of the securities outlined in Condition 209 (a). The form of any such trust agreement shall be filed with the Secretary with proof of obtaining the relevant security.

f. All of the letters of credit and performance bond with surety for NYSDOT outlined in Condition 209 (a) shall provide that the beneficiaries thereof may, subject to the cure provisions set forth in the underlying letters of credit or performance bond with surety, exercise their right to draw on it following the occurrence of any of the events set forth in subsections (i) hereof:

i. Decommissioning will commence if: (1) the Project's construction has halted for a period of 12 continuous months, unless the 12-month period of inactivity is the result of reasonably unforeseen circumstances, recommencement is being actively pursued in good faith by the Certificate Holder, or the period of inactivity is due to a Force Majeure event; or (2) after commercial operation of the Project, if the Project has not generated electricity for a period of 12 continuous months, unless the 12-month period of no energy output is due to a Force Majeure event or the result of a repair, restoration, or improvement to an integral part of the Project that affects the generation of electricity and that repair, restoration, or improvement is being actively pursued in good faith by

the Certificate Holder. The Certificate Holder shall file notice with the Secretary if it is anticipated that repairs or completion of construction (or similar) will extend beyond a 12-month inactive period; written notice shall also be provided to: (1) DPS Staff, NYSDEC, NYSDOT, and NYSDOS, and (2) and adjoining landowners of planned decommissioning and site restoration activities prior to commencement of those activities.

210. When Certificate Holder files its Phase 1 EM&CP, Certificate Holder will prepare a Short-Term Decommissioning Plan that will include the same information outlined above for the Primary Decommissioning Plan but only for those assets that are captured by the Phase 1 EM&CP. Certificate Holder will secure two a letters of credit for the Town and County and a performance bond with surety for the NYSDOT for the Phase 1 work: (1) for lands under the jurisdiction of the NYSDOT, (2) for lands under the jurisdiction of the Town, and (3) for lands under the jurisdiction of the County. Each letter of credit and performance bond with surety will be, at a minimum, in the amount of the decommissioning cost estimate included in the Short-Term Decommissioning Plan as approved by the Commission's relevant order issued in this proceeding to decommission any Phase 1 assets that are abandoned by the Certificate Holder in the event future phases of construction are not completed and the Project is not ultimately energized (together, the Short-Term Security). When construction commences on Post-Phase 1 Project components, the Short-Term Security will be released and replaced in full by the letters of credit and performance bond with surety described in Condition 209 (a). In the event the NYSDOT, Town, or County cannot hold their respective Short-Term Security, the Certificate Holder will establish appropriate standby trusts to hold the same in accordance with the process outlined in Condition 209

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APPENDIX E

SPECIFICATIONS FOR THE DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

APPENDIX E

SPECIFICATIONS FOR THE DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

Section A of the Specifications for the Development of Environmental Management and Construction Plan (Specifications) addresses the development of the plan and profile drawings, and maps portion of the Environmental Management and Construction Plan (EM&CP).

Section B addresses the description and statement of objectives, techniques, procedures, and requirements, *i.e.*, the textual portion of the EM&CP. A table of contents will be included for the EM&CP and each section, appendix or exhibit containing ten or more pages.

If any particular requirement of the Specifications is not applicable, so indicate and briefly explain. The Specifications do not reference all potential Certificate Conditions that could be applicable to the EM&CP, rather the Specifications and Certificate Conditions shall be read in concert to develop a comprehensive EM&CP.

In the event that the EM&CP is filed with the Public Service Commission in phases, each phase of the EM&CP will include the information specified in this Appendix E to the extent applicable.

A. EM&CP Plan and Profile Drawings and Maps

The EM&CP maps, charts, photostrip maps, and illustrations shall include, but need not be limited to, the following information:

1. Plan and Profile Details

A Line[1] Profile (at an appropriate scale) and plan drawings (scale minimum 1 inch = 200 feet)[2] showing:

a. The boundaries of any new, existing, and/or expanded right-of-way (ROW)[3] or road boundaries, and where cables are to be constructed underground; plus, areas contiguous to the ROW or street within which the Certificate Holders will obtain additional rights.
b. The location of each Facility structure (showing its height, material, finish and color, and type), structural foundation type (*e.g.*, concrete, direct bury), fence, gate, down-

[1] For underground project design, show relation of project to final surface grade, indicating design depth-of-cover.
[2] Contour lines (preferably at 5-foot intervals) are desirable on the photostrip map if they can be added without obscuring the required information.
[3] The term "right-of-way" in these *Specifications* includes property, whether owned in fee or easement, to be used for substations, disposal sites, underground terminals, storage yards, and other associated facilities. Where such properties cannot reasonably be shown on the same plan or photo-strip, maps, or plan drawings used for the transmission line, additional maps or drawings at convenient scales should be used.

guy anchor, and any counterpoise required for the Facility (typical counterpoise drawings will suffice recognizing that before field testing of installed structures the Certificate Holder may be unable to determine the specific location of all required counterpoise), conductors, insulators, mid-span splices, and static wires and other components attached to Facility structures.

c. Existing overhead utility or non-utility structures on the ROW and indicate those to be removed or relocated (include circuit arrangements where new structures will accommodate existing circuits, indicate methods of removal of existing facilities, and show the new locations, types and configurations of relocated facilities).
d. Any underground utility or non-utility structure (including the Project's splice vault locations). This section will also include section details of the Project's typical man hole and vault installations.
e. The relationship of the Facility to nearby fence lines; roads; trails; railways; airfields; property lines; hedgerows; surface waters; wetlands; other water bodies; significant habitats; dredging locations; no-anchor areas; associated facilities; flowing water springs; nearby buildings or structures; major antennas; oil or gas wells, and blowdown valves.
f. The location of any proposed new or expanded converter station, substation, or other terminal or associated utility or non-utility structure (attach plan[4] - plot, grading, drainage, and electrical - and elevation views with architectural details at appropriate scales). Indicate the type of outdoor lighting, including design features to avoid off-site illumination and minimize glare; the color and finish of all structures; the locations of temporary or permanent access roads, parking areas, construction contract limit lines, property lines, designated floodways and flood-hazard area limits, buildings, sheds, relocated structures, and any plans for water service and sewage and waste disposal.
g. The location and boundaries of any areas whether located on- or off-ROW proposed to be used for fabrication, designated equipment parking, staging, access (e.g., water access at Smith Point Marina and temporary landing structure), laydown, and conductor pulling and pipe stringing. Indicate any planned fencing, surface improvements, and screening of storage and staging areas.
h. The locations for ready-mix concrete chute washout and any other cleaning activities (e.g., control of invasive species).
i. All locations, both on and offshore, where horizontal directional drilling (HDD) or other trenchless installation methods are proposed.

[4] Preferably 1" = 50' scale with 2-foot contour lines.

2. Stormwater Pollution Prevention

a. Include on the plan and profile drawings the acknowledged Storm Water Pollution Prevention Plan (SWPPP) details. Include the locations of soil erosion and sediment control measures developed in accordance with the latest version of the New York Standards and Specifications for Erosion and Sediment Control (*e.g.*, stabilized construction entrances, silt fences, check dams, and sediment traps) and applicable MS4 requirements.

b. Include on the plan and profile drawings the approved SWPPP locations of all permanent stormwater management controls that are required based on site-specific conditions or conditions of the Certificate.

3. Vegetation Clearing and Disposal Methods

Identify on the plan and profile drawings:

a. the locations of sites requiring trimming or clearing of vegetation and the geographic limits of such trimming or clearing;

b. the specific methods for the type and manner of cutting and disposition or disposal method for cut vegetation (*e.g.*, chip; cut and pile; salvage merchantable timber, etc.);

c. the methods for management of vegetation to be cut or removed at each site;

d. any geographical area bounded by distinctly different cover types requiring different cut-vegetation management methods;

e. any geographical area bounded at each end by areas requiring distinctly different cut-vegetation methods due to site conditions such as land use differences, population density, habitat or site protection, soil or terrain conditions, fire hazards, or other factors;

f. different property-owners requesting specific vegetation treatment or disposal methods;

g. areas requiring (off-ROW) danger tree removal; and,

h. the location of any areas where specific vegetation protection measures will be employed and the details of those measures to avoid damage to specimen tree stands of desirable species, important screening trees, or hedgerows.

4. Building and Structure Removal

Indicate the locations of any buildings or structures to be acquired, demolished, moved, or removed.

5. Waterbodies

a. Indicate the name, water quality classification and location of all rivers and streams, (whether perennial and intermittent) and drainages crossed by the proposed ROW or any off-ROW access road constructed, improved, or maintained for the Facility. On the plan and profile drawings, indicate:

a. the ordinary high water line (OHW), mean high water (MHW) and mean high high water (MHHW);
b. stream crossing method and delineate any designated streamside "protective or buffer zone" in which construction activities will be restricted to the extent necessary to minimize impacts on rivers and streams;
c. the activities to be restricted in such zones; and,
d. identify any designated floodways or flood hazard areas to be traversed by the Facility or access roads, or otherwise used for Facility construction or the site of associated facilities.

b. Show the location of all potable water sources, including springs and wells on the ROW or within 100 feet of the ROW where dewatering will occur based as shown on publicly available water well data or publicly available sources, indicating, on a site-by-site basis, precautionary measures to be taken to protect each water source.

6. Wetlands

a. All wetlands and wetland adjacent areas (including tidal and freshwater wetlands)) located within the ROW or crossed by the ROW or any off-ROW access road constructed, improved, or maintained for the Facility shall be depicted on EM&CP drawings. The plan and profile drawings shall delineate the wetland "protective or buffer zone" in which construction activities will be restricted to the extent necessary to minimize impacts on wetlands.
b. Indicate the location and type (*i.e.*, identification code for regulated town, state, or federal wetlands) of any wetland (*e.g.*, marsh, meadow, bog, or scrub-shrub or forested swamp) within or adjoining the ROW or any access road, as determined by site investigation and delineation.
c. Indicate type and location of precautionary measures (*e.g.*, mats) to be taken to protect all wetlands, associated drainage patterns, and wetland functions.

7. Land Uses

a. Sensitive Land Uses and Resources
Indicate the location and identification of sensitive land uses and resources that may be affected by construction of the Facility or by construction-related traffic (e.g., hospitals, emergency services, sanctuaries, schools, and residential areas).
b. Geologic, Historic, and Scenic or Park Resources
Indicate the locations of geologic, historic, and existing or planned scenic or park resources and specify measures to minimize impacts to these resources (e.g., fencing, signs).
c. Recreational

Indicate the locations where existing or planned recreational use areas, would affect or be affected by the Facility location, construction or other ROW preparation. Specify the

measures that will be taken to protect these resources (e.g., flagging, signage, no work windows).

8. Access Roads, Lay-Down Areas and Workpads

Indicate the locations of temporary and permanent on- and off-ROW access roads, lay-down areas and workpads. Provide construction type, material, and dimensions. Indicate provisions for upgrading any existing access roads.

9. Noise Sensitive Sites

Show the locations of noise-sensitive areas along the proposed ROW (*e.g.*, residences).

10. Ecologically and Environmentally Sensitive Areas

Indicate the general locations of any known ecologically and environmentally sensitive sites (*e.g.*, archaeological sites; fish and wildlife habitat; rare, threatened, and endangered species or habitats; forest and vegetation; open space; areas of important aesthetic or scenic quality; deer winter yards, etc.), within or nearby the proposed or existing ROW or along the general alignment of any access roads to be constructed, improved or maintained for the Facility. Specify the measures that will be taken to protect these resources (e.g., fencing, flagging, signs "Sensitive Environmental Areas, No Access").

11. Invasive Species of Special Concern

Identify the location(s) of invasive species of special concern and the prescribed method to control the spread and/or eradicate the identified species.

12. Herbicides, Pesticides and Fungicides

On the plan and profile drawing notes, indicate areas where herbicides, pesticides and fungicides may be used for construction or maintenance at OnCS–DC.

B. Description and Statement of Objectives, Techniques, Procedures and Requirements

The textual portion of the EM&CP for the Facility shall include, but need not be limited to, all of the following information:

1. Facility Location and Description

Describe the location and limits of the site or ROW and explain the need for any additional rights. For each structure type, indicate the GSA-595A Federal standard color designation or manufacturer's color specification to be used for painted structures. State any objections raised by Federal, State, or local transportation (highways, waterways, or aviation) officials to the final location or manner of installation of, or access to, the certified Facility.

2. Stormwater Pollution Prevention

a. The information included in the acknowledged MS4 approved SWPPP.

b. In areas of coastal erosion hazard, include plans to demonstrate compliance with the standards for coastal erosion hazard protection as required by 6 NYCRR Part 505 Coastal Erosion Management.

3. Vegetation Clearing and Disposal Methods

a. Describe the specific methods and rationale for the type and manner of cutting and disposition or disposal methods for cut vegetation.

b. Detail specific measures employed to avoid damage to specimen tree stands of desirable vegetation, rare, threatened and endangered species, important screening trees, and hedgerows.

c. Identify the factors such as the attributes of the site, outcome of landowner negotiations, and attributes of the logs, upon which Certificate Holder's removal of the merchantable logs resulting from clearing the ROW for the Facility will be based.

d. Describe methods of compliance with 6 NYCRR Part 192 – Forest Insect and Disease Control, applicable New York State Department of Environmental Conservation (NYSDEC) quarantine orders, 6 NYCRR Part 575 Invasive Species Spread Prevention and New York State Department of Agriculture and Markets (NYSAGM) regulations.

4. Building and Structure Removal

Indicate the locations of any buildings or structures to be acquired, demolished, moved, or removed. Provide the rationale for the acquisition and removal of buildings or structures.

5. Waterbodies

a. Describe the measures to be taken to protect stream bank stability, stream habitat, and water quality including, but not limited to: crossing technique; crossing structure type; timing restrictions for in-stream work; stream bed and bank restoration measures; vegetation restoration measures; and other site-specific measures to minimize impacts, protect resources, and manage Facility construction.

b. Indicate the procedures that were followed to inventory such resources and provide copies of any resulting data sheets and summary reports.

c. Develop a table of waterbodies crossed by the Facility and include: Town (location), Stream Name, Field/Map Identification Name, Perennial or Intermittent, New York Stream Classification, Water Index Number, Crossing Method and Length, Fishery Type, GPS coordinates.

6. Wetlands

a. For each State-regulated wetland, indicate the following: town (location); wetland field designation; NYSDEC classification code; wetland type; proposed structure located

within wetland; total area of temporary disturbance/impact total area of permanent disturbance in NYSDEC wetlands (sq. ft.); area crossed by Facility (sq. ft.); conversion of State-regulated forested wetlands (sq. ft.).

b. Describe all activities that will occur within State-regulated wetlands or adjacent areas (e.g., construction, filling, grading, vegetation clearing, and excavation) and assure that the activity is consistent with the weighing standards set forth in 6 NYCRR 663.5(e) and (f). Describe how impacts to wetlands, adjacent areas, associated drainage patterns, and wetland functions will be avoided, and how impacts will be minimized.

c. Describe the precautions or measures to be taken to protect all other wetlands (*e.g.*, town, federal wetlands) associated drainage patterns, and wetland functions.

7. Land Uses

a. Sensitive Land Uses

Describe the sensitive land uses (*e.g.*, hospitals, emergency services, sanctuaries, schools, residential areas) that may be affected by construction of the Facility or by construction-related traffic and specify measures to minimize the impacts on these land uses.

b. Geologic, Historic and Scenic or Park Resources

Describe the geologic, historic, and scenic or park resources that may be affected by construction of the Facility or by construction-related traffic and specify measures to minimize impacts on these resources. Indicate the procedures that were followed to identify such resources and specify the measures that will be taken to protect or preserve these resources. Include an overview of the parkland alienation requirements and status of the legislative approval process for Smith Point County Park and Southaven County Park Reports prepared to identify and analyze such sites shall be made available to Department of Public Service (DPS) Staff upon request.

c. Recreation Areas

Explain how proposed or existing recreation areas will be avoided or accommodated during construction, operation, and maintenance of the Facility.

8. Access Roads, Laydown Areas and Workpads

a. Discuss the necessity for access to the ROW, including the areas where temporary or permanent access is required; and the nature of access improvements based on natural features, equipment constraints, and vehicles to be used for construction and maintenance, and the duration of access needs through restoration and the maintenance of the Facility.

b. Discuss the types of access which will be used and the rationale for employing that type of access including consideration of:

i. temporary installations (*e.g.*, corduroy, mat, fill, earthen road, geotextile underlayment, gravel surface, etc.);
ii. permanent installations (*e.g.*, cut and fill earthen road, geotextile underlayment, gravel surface, paved surface, etc.);
iii. use of roads, driveways, farm lanes, rail beds, etc.; and,
iv. other access, *e.g.*, helicopter, temporary landing structure, or barge placement. For each temporary and permanent access type, provide a figure or diagram showing a typical installation (include top view, cross section, and side view with appropriate distances and dimension). Where existing access ways will be used, indicate provisions for upgrading to meet appropriate standards.

c. Indicate the associated drainage and erosion control features to be used for access road construction and maintenance. Provide diagrams and specifications (include plan and side views with appropriate typical dimensions) for each erosion control feature to be used, such as:
i. staked straw bale or check dam (for ditches or stabilization of topsoil);
ii. broad-based dip or berm (for water diversion across the access road);
iii. roadside ditch with turnout and sediment trap;
iv. French drain;
v. diversion ditch (water bar);
vi. culvert (including headwalls, aprons, etc.);
vii. sediment retention basin (for diverting out-fall of culvert or side ditch); and,
viii. silt fencing.

d. Indicate the type(s) of stream crossing method to be used in conjunction with temporary and permanent access road construction. Provide diagrams and specifications (include plan and side view with appropriate dimensions) for each crossing device and rationale for their use. Stream crossing devices may include but not be limited to:
i. timber mat;
ii. culverts including headwalls;
iii. bridges (either temporary or permanent); and,
iv. fords.

e. All diagrams and specifications should include material type and size to be placed in streams and on stream approaches.

f. If access and workpad areas cannot be limited to upland areas, provide justification for any access and workpad areas which are proposed to be located in a wetland or stream or waterbody.

9. <u>Noise Sensitive Sites</u>

Specify procedures to be followed to minimize noise impacts related to ROW clearing, and construction and operation of the Facility. Indicate the types of major equipment to be

used in construction or Facility operation; sound levels at which that equipment operates; days of the week and hours of the day during which that equipment will normally be operated; any exceptions to these schedules; and any measures to be taken to reduce audible noise levels caused by either construction equipment or Facility operation.

10. Ecological and Environmentally Sensitive Sites

a. Indicate the procedures that were followed to identify ecological and environmental resources (*e.g.*, archaeological sites; fish and wildlife habitat; rare, threatened, and endangered species or habitats; forest and vegetation; open space; areas of important aesthetic or scenic quality; deer winter yards) and specify the measures that will be taken to protect or preserve these resources. Reports prepared to identify and analyze such sites shall be identified,and made available upon request.

b. The final geotechnical reports related to the Project's landfall and onshore components will be included in the EM&CP.

11. Invasive Species of Special Concern

a. Provide an invasive species prevention and management plan for invasive species of special concern, prepared in consultation with DPS Staff based on the pre-construction invasive species survey of invasive species within the ROW.

b. The plan shall include measures that will be implemented to minimize the introduction of invasive species of special concern and the spread of existing invasive species of special concern during construction (*e.g.*, soil disturbance, vegetation clearing, transportation of materials and equipment, and landscaping/revegetation).

12. Herbicides, Pesticides and Fungicides

a. Specify the locations where herbicides, pesticides and fungicides may be applied. Provide a general discussion of the site conditions (*e.g.*, land use, target and non-target vegetation species composition, height, and density) and the choice of herbicide, formulation, application method, and timing.

b. Describe the procedures that will be followed during application to protect non-target vegetation, streams, wetlands, potable waters and other water bodies, and residential areas and recreational users on or near the ROW.

13. Offshore Construction

a. Describe in detail the following construction requirements for underwater cable installation:

    i. Pre-lay grapnel run along the installation route;

    ii. Installation methods (including but not limited to mechanical cutter, mechanical plow [which may include a jetting system], jet sled, jet trencher,

and/or controlled flow excavator) and locations at which each method is expected to be employed;

iii. The location of the exit pit;

iv. Transition methods for HDD to underwater cable;

v. Cable-laying methods including barge positioning, midline buoys, and use of spuds or anchors, if necessary.

14. Fugitive Dust Control

Specify appropriate measures that will be used to minimize fugitive dust and airborne debris from construction activity.

15. Petroleum and Chemical Handling Procedures

a. Include a plan for the storage, handling, transportation, and disposal of petroleum, fuels, oil, chemicals, hazardous substances, and other potentially harmful substances which may be used during, or in connection with, the construction, operation, or maintenance of the Facility. Address how to avoid spills and improper storage or application in the vicinity of any wetland, river, creek, stream, lake, reservoir, spring, well, or other ecologically sensitive site, or existing recreational area along the ROW and access roads.

b. Include a plan for responding to and remediating the effects of any spill of petroleum, fuels, oil, chemicals, hazardous substances, and other potentially harmful substances in accordance with applicable State and Federal laws, regulations, and guidance, and include proposed methods of handling spills of petroleum, fuels, oil, chemicals, hazardous substances, and other potentially harmful substances which may be stored or utilized during the construction and site restoration, operation, and maintenance of the Facility.

c. All offshore construction vessels contracted to conduct any work associated with all phases of the project will have an Environmental Protection Agency, United States Coast Guard, and Bureau Of Ocean Energy Management compliant Oil Spill Response Plan (OSRP) for accidental releases of petroleum, fuels, oil, chemicals, hazardous substances into the marine and coastal environment, Spill Prevention, Control, and Countermeasure (SPCC) Plan(s) to minimize the potential for unintended releases of petroleum and other hazardous chemicals during Project construction and operation, including in the marine environment, shall be included in the EM&CP.

16. Environmental Supervision

a. Describe protocols for supervising demolition, vegetation clearing, use of herbicides, construction, and site restoration activities to ensure minimization of environmental impact and compliance with the environmental protection provisions specified by the Certificate.

b. Specify the titles and qualifications of personnel proposed to be responsible for ensuring minimization of environmental impact throughout the demolition, clearing, construction, and restoration phases, and for enforcing compliance with environmental protection provisions of the Certificate and the EM&CP. Indicate the amount of time each supervisor is expected to devote to the project.
c. Specify responsibilities for personnel monitoring all construction activities, such as clearing, sensitive resource protection, site compliance, EM&CP change notices, etc.
d. Explain how all environmental protection provisions will be incorporated into contractual specifications,and communicated to those employees or contractors engaged in demolition, clearing, construction, and restoration.
e. Describe the procedures to "stop work" in the event of a Certificate violation.
f. Identify the company's designated contact including 24/7 emergency phone number, for assuring overall compliance with Certificate conditions.

17. <u>Clean-up and Restoration</u>

Describe the Certificate Holder's program for ROW clean-up and restoration, including:

a. the removal of any temporary roads; restoration of lay-down or staging areas; the finish grading of any scarified or rutted areas; the removal of waste (*e.g.*, excess concrete), scrap metals, surplus or extraneous materials or equipment used;
b. plans, standards and a schedule for the restoration of vegetative cover; including, but not limited to, specifications to address:
    i. design standards for ground cover:
        1. species mixes and application rates by site;
        2. site preparation requirements (soil amendments, stone removal, subsoil treatment, or drainage measures);
        3. acceptable final cover % by cover type;
    ii. planting installation specifications and follow-up responsibilities;
    iii. a schedule or projected dates of any seeding and/or planting; and,
    iv. plans to prevent unauthorized access to and along the ROW.

18. <u>Visual Impact Mitigation</u>

Provide details of screening or landscape plans prescribed at OnCS–DC and other locations where vegetation is to be removed for construction.

18. <u>ROW Encroachment Plan</u>

Provide detailed plans for identifying and resolving potential encroachments to the existing and proposed ROW (e.g., temporary signage, lane closures, placement of temporary barriers, and traffic diversion).

19. <u>Wetland Mitigation Plan</u>

Provide a proposal to address wetlands mitigation, for all permanent impacts to State-regulated wetlands and federally-regulated wetlands, if prescribed by the Army Corps of Engineers, including, for example, but not limited to, the permanent conversion of forested wetland to scrub-shrub wetland. If such proposal is to prepare a detailed mitigation plan for State regulated wetlands, it shall separately address impacts to each of the wetlands benefits described in ECL § 24-0105(7). Plans shall provide for wetland mitigation in the same watershed to the maximum extent possible.

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APPENDIX F

PROPOSED WATER QUALITY CERTIFICATION

APPENDIX F

PROPOSED WATER QUALITY CERTIFICATION

NEW YORK STATE PUBLIC SERVICE COMMISSION
WATER QUALITY CERTIFICATION

Pursuant to:	Section 401 of the Federal Water Pollution Control Act, 33 USC Section 1341, Article VII of the New York Public Service Law (PSL), and 6 NYCRR Section 608.9
Certification Issued to:	Sunrise Wind LLC (Sunrise Wind)

Project Description and Location

Sunrise Wind submitted an application (the Application) to the New York State Public Service Commission (the Commission), in accordance with Article VII of the PSL, for a Certificate of Environmental Compatibility and Public Need (CECPN) to construct, operate, and maintain the portions in New York State, both onshore and offshore, of the Sunrise Wind project, a 50/50 joint venture between Orsted North America Inc. and Eversource Investment LLC.

In summary, the project will involve: (i) one high-voltage direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 5.2 miles (mi) (8.4 kilometers [km]) in length in New York State (NYS) waters and up to 1,054 feet (ft) (321 meters [m]) located onshore (i.e., above the Mean High Water Line [MHWL], as defined by the United States [US] Army Corps of Engineers [USACE] [33 Code Federal Regulations (CFR) 329]) and underground, up to the transition joint bay (TJB) (the SRWEC–NYS); (ii) a DC underground transmission circuit (320 kV) up to 17.5 mi (28.2 km) in length primarily within existing roadway rights-of-way (ROW) and concrete and/or direct buried splice vaults and associated components (the Onshore Transmission Cable); (iii) an onshore converter station that will transform the project's voltage from 320 kV to 138 kV alternating current (AC) (the OnCS–DC); (iv) two AC underground circuits (138 kV) approximately 1.1 mi (1.7 km) in length, which will connect the new OnCS–DC to the existing Holbrook Substation (the Onshore Interconnection Cable); (v) fiber optic cables co-located with both the Onshore Transmission Cable and Onshore Interconnection Cable; (vi) laydown yards; and (vii) the expansion of the Holbrook Substation to accept the Onshore Interconnection Cable (the Holbrook Substation Expansion). The SRWEC–NYS, Onshore Transmission Cable, OnCS–DC, Onshore Interconnection Cable, fiber optic cables, laydown yards, and the Holbrook Substation Expansion shall collectively be referred to herein as the "Project."

The transition of the SRWEC–NYS to the Onshore Transmission Cable will occur where the cables are spliced together at the TJB located at the work area within Smith Point County Park on Fire Island in the Town of Brookhaven (the Landfall Work Area). From the TJB within the Landfall Work Area, the Onshore Transmission Cable will run parallel to Fire Island Beach Road within the paved Smith Point County Park parking lot approximately 2,000 ft (610 m) west, crossing the William Floyd Parkway to a recreational area located to the west of William

Floyd Parkway. The Onshore Transmission Cable will then be routed across the intracoastal waterway (ICW) in a northwest direction via an Intracoastal Waterway Horizontal Directional Drill (ICW HDD) approximately 0.5 mi (0.8 km) in length within a corridor width of 260 ft (79 m) to a paved parking lot within the Smith Point Marina along East Concourse Drive. From the ICW work area (the ICW Work Area), the Onshore Transmission Cable will be routed north for approximately 800 ft (0.24 km) before turning east for approximately 550 ft (0.2 km) following East Concourse Drive. The Onshore Transmission Cable will then extend north approximately 3.6 mi (5.8 km) along William Floyd Parkway to the intersection with Surrey Circle. The Onshore Transmission Cable will be routed along Surrey Circle for approximately 0.1 mi (0.2 km) and will continue north along Church Road. The Onshore Transmission Cable will travel west along Mastic Boulevard for approximately 0.2 mi (0.3 km) to the intersection with Francine Place and then turn north on Francine Place for approximately 0.1 mi (1.6 km) to the intersection with Montauk Highway. The Onshore Transmission Cable will cross Montauk Highway to Revilo Avenue and will continue north along Revilo Avenue for approximately 0.07 mi (0.1 km) to the work area for the Sunrise Highway crossing. The Onshore Transmission Cable will cross Sunrise Highway via trenchless methods to Revilo Avenue, continuing north to the intersection with Victory Avenue and then continue west on Victory Avenue for approximately 2.1 mi (3.4 km) to Horseblock Road. The Onshore Transmission Cable will continue northwest along Horseblock Road for approximately 3.2 mi (5.1 km). The Onshore Transmission Cable will turn north and cross the Long Island Rail Road (LIRR) to Long Island Avenue via trenchless methods. The Onshore Transmission Cable will then be routed west along the Long Island Expressway (LIE) South Service Road for approximately 4.1 mi (6.8 km) and continue to Waverly Avenue where it will turn south for approximately 0.4 mi (0.6 km) to Long Island Avenue. The Onshore Transmission Cable will then follow Long Island Avenue west to Union Avenue to the OnCS–DC. The OnCS–DC will support the Project's interconnection to the existing electrical grid by transforming the Project voltage to 138 kV AC. Finally, the Onshore Interconnection Cable from the OnCS–DC will begin at a set of termination structures at the OnCS–DC and will be routed entirely underground along town roads and existing utility-owned or controlled property up to 1.1 mi (1.8 km) in length and connect to the existing Holbrook Substation. An expansion of the Holbrook Substation will be required to accommodate the Project.

Certification

The New York State Public Service Commission hereby certifies pursuant to Section 401 of the Federal Water Pollution Control Act, 33 U.S.C. Section 1341(a)(1) and Article VII of the New York Public Service Law that the Project, as conditioned herein, complies with applicable requirements of Sections 301, 302, 303, 306 and 307 of the Federal Water Pollution Control Act, as amended, and applicable New York State water quality standards, limitations, criteria and other requirements set forth in Parts 608.9(a), and 701 through 704 of Title 6 of New York Codes, Rules and Regulations (NYCRR), provided that all of the conditions listed herein are met. This Certification is issued in conjunction with the NYS Public Service Law Article VII CECPN sought by Sunrise Wind in, and based on the record of, Case 20-T-0617.

Conditions:

1. No in-water work shall commence until all pre-construction conditions relating to such work contained in the CECPN in Case 20-T-0617 have been met to the satisfaction of the New York State Department of Public Service.

2. Construction, operation, maintenance, repair and decommissioning of the Project shall at all times be in conformance with (a) the Application and Joint Proposal in Case 20-T-0617 (as amended and supplemented), to the degree not superseded by the CECPN; (b) all conditions of approval contained in the CECPN; (c) the approved Environmental Management and Construction Plan(s) (EM&CP); and (d) all conditions incorporated in any order approving the EM&CP in Case 20-T-0617, to the extent such documents referenced in (c) and (d) above pertain to Sunrise Wind's compliance with the New York State Water Quality Standards necessary and appropriate for issuance of, and compliance with, this Certification.

3. Sunrise Wind shall provide a copy of this Water Quality Certification (Certification) to the U.S. Army Corps of Engineers along with a copy of the Application, CECPN, and the EM&CP so that the U.S. Army Corps of Engineers will have a complete record of the conditions that apply hereto.

4. Sunrise Wind shall provide to all construction contractors performing work on the Project complete copies of this Certification, the CECPN, and the EM&CP.

5. All water quality analyses required by this Certificate must be conducted by a laboratory certified by the NYSDOH ELAP. (Certificate Condition 184).

6. All drilling fluid additives must be water-based unless otherwise approved by DPS Staff in consultation with NYSDEC. If a polymer-based additive is proposed, it must be included in the EM&CP with the corresponding SDS containing eco-toxicity information and approved NYSDEC Water Treatment Chemical Form. Petroleum-based additives are strictly prohibited. If a polymer-based additive is proposed, the Certificate Holder will propose to use a biodegradable polymer-based additive if a suitable product exists. (Certificate Condition 93 [e]).

7. Water quality standards set forth in 6 NYCRR Parts 701, 702, 703 and 704, and sections 301, 302, 303, 306, and 307 of the federal Clean Water Act (see 33 USC §§ 1311, 1312, 1313, 1313a, and 1317) shall not be contravened. Issuance of a Water Quality Certification also implies compliance with standards assuming that conditions placed in the certification are complied with. (Certificate Condition 181).

    a. Water Quality Standard: None from sewage, industrial waste or other wastes that will cause deposition or impair the waters for their best usages.

8. Construction and scheduled maintenance work at the Landfall Work Area and ICW crossing shall be confined to the period beginning the day after Labor Day and ending on the day before Memorial Day of the succeeding calendar year, unless further restricted by the applicable Host Community Benefit Agreement.

9. Certificate Holder shall install the SRWEC–NYS, exclusive of the Landfall HDD and offshore HDD exit, using either simultaneous lay and burial or pre-lay and post-burial processes.

    a. The following processes may be used, individually or in combination, to install the SRWEC–NYS, exclusive of the HDD: mechanical cutter, mechanical plow (which may include a jetting system), jet sled, jet trencher, controlled flow excavator, boulder grab, and/or trailing suction hopper dredge. (Certificate Condition 87).

10. A pre-activity water quality calibration will be conducted to ensure that TSS may be accurately estimated in real-time during water quality monitoring activities. The pre-activity water quality calibration will be described in detail in the suspended solids and water quality monitoring plan. (Certificate Condition 186).

11. The following limit must be achieved for TSS at a distance of 1,500 feet down current (based on tide direction) of sediment disturbing activities:

    a. Guidance Value: TSS 100 mg/L above ambient for all offshore construction activities.

    b. If during water quality monitoring, the real-time TSS concentrations established by the calibration curve exceed the TSS limits established in this Certificate, DPS Staff, NYSDEC Staff, and the Aquatic Environmental Monitor shall be immediately notified and work shall be ceased immediately and then restarted at modified levels that will reduce TSS levels and bring them into compliance with Condition 192 (a) (b) in accordance with iterative changes outlined in Condition 192 (c) (ii) and (iii). The Certificate Holder will continue to iteratively implement operational controls and measure the resulting TSS. The Certificate Holder will notify the Aquatic Monitor throughout the process about any such operational adjustments.

        i. During implementation of corrective actions, DPS Staff and NYSDEC may specify additional monitoring until compliance with Water Quality Standards is demonstrated. Samples shall be collected until resumption of

routine monitoring is authorized by DPS Staff in consultation with NYSDEC

ii. For purposes of iterative changes to the use of a CFE or hand jetting tools, the following changes may be employed: changing the rate of advancement of the CFE or hand jet tool, modifying or varying hydraulic jetting pressures, and/or implementing other reasonable operational controls that may reduce suspension of in-situ sediments in a manner that would not materially delay the progress of work to complete the installation procedure.

iii. For purposes of iterative changes to the use of a barge mounted excavator, the following changes may be employed: changing the rate of advancement of the excavator, modifying the depth of the excavator bucket in the water column, implementing other reasonable operational controls that may reduce suspension of in-situ sediments in a manner that would not materially delay the progress of work to complete the installation procedure, operate the bucket so as to control the rate of the descent and to maximize the depth of penetration without overfilling the bucket, and/or to control bucket retrieval rates. (Certificate Condition 187).

12. Visual observations of turbidity will be identified in the applicable EM&CP caused by underwater cable and HDD exit pit installation/backfill activities, pre-lay grapnel run operations, maintenance, and decommissioning activities must be conducted to ensure compliance with the narrative water quality standard in 6 NYCRR § 703.2: “No increase that will cause a substantial visible contrast to natural conditions.” (Certificate Condition 193).

13. The Certificate Holder shall incorporate within the EM&CP and implement a Suspended Sediment and Water Quality Monitoring Plan pertaining to offshore and onshore activities. The Certificate Holder must submit a Suspended Sediment and Water Quality Monitoring Plan for review and comment by DPS Staff, NYSDEC, and NYSDOS forty-five (45) days prior to the filing of the EM&CP. The Suspended Sediment and Water Quality Monitoring Plan must be prepared in accordance with the “Scope of Study: Suspended Sediment/Water Quality Monitoring” attached as Appendix I of the Joint Proposal.

a. Water quality monitoring shall be conducted within the Project Corridor as described in Appendix B during seabed preparations, jet trenching pre-construction and construction activities, excavation of the HDD exit, pre-lay grapnel run, cable installation, backfill of the HDD exit, sand wave

leveling, and maintenance and decommissioning activities that involve disturbance of sediments (together, "Monitored Construction Activities").

b. Maintenance and decommissioning activities that result in only minor disturbance of sediments, including: (i) anchor sweep; (ii) anchoring; (iii) placement of jack-up barge; (iv) hand jetting; or (vi) other activities as determined by DPS Staff, in consultation with NYSDEC, shall not require water quality monitoring. (Certificate Condition 182).

14. If any jet trenching technology is used to lay the cable, trials must be conducted within representative sections or areas proximate to the proposed underwater cable route in NYS waters prior to cable installation to ensure compliance with Total Suspended Solids ("TSS") threshold limits as defined in Condition 187 (a). The trial will include approximately 1,000 feet of jet trenching operations within an area to be specified in the Jet Trencher Trial Plan that will be submitted as part of the EM&CP. The following conditions apply to jet trencher trials:

a. Pre-monitoring water quality calibration will be conducted prior to the jet trencher trails and will enable real-time estimation of TSS concentrations during the trials.

b. A combination of acoustic ("ADCP") and calibrated optical backscatter ("OBS") measurements will be used to estimate TSS concentrations on selected transects. TSS and OBS turbidity water samples will be collected one thousand five hundred (1,500) feet up-current (for baseline) and one thousand five hundred (1,500) feet down-current of the jet plow, at three-interval depths (near surface, mid-depth, and near bottom) and analyzed by a NYSDOH Environmental Laboratory Approval Program ("ELAP") certified laboratory. Water quality monitoring requirements during jet trencher trials will be described in detail in the suspended solids and water quality monitoring plan;

c. The Certificate Holder must coordinate with DPS Staff and NYSDEC to share real-time TSS measurement estimates collected during the jet trencher installation trials to evaluate whether the operating conditions result in TSS concentrations that exceed the TSS threshold limit;

d. If the jet trencher trials demonstrate that the operating conditions result in TSS concentrations that exceed the TSS threshold limit established herein, the Certificate Holder notify DPS Staff and NYSDEC and implement feasible modifications to the jet trencher operating conditions to further reduce in-situ sediment re-suspension associated with the jet trencher installation procedure; and

e. Jet trencher operations may proceed after Jet Trencher Trial results are reviewed in real-time and accepted by DPS Staff and NYSDEC. Review of this information by DPS and NYSDEC staffs shall not unreasonably delay the commencement of installation of the underwater cable system. (Certificate Condition 188).

15. The following conditions apply if jet trenching technology is used to install the SRWEC–NYS:

a. The Certificate Holder must operate the jet trencher in accordance with the operating conditions determined through jet trencher trials to maintain the suspension of in-situ sediments within the Total Suspended Solid (TSS) limits;

b. If, during jet trencher installation of the cable, TSS concentrations exceed the TSS limits established in this Certificate, the Certificate Holder shall follow the process established in Conditions 188 and 189 (c).

c. For purposes of iterative changes to the use of the jet trencher, the following changes may be employed: changing the rate of advancement of the jet trencher, modifying or varying hydraulic jetting pressures, and/or implementing other reasonable operational controls that may reduce suspension of in-situ sediments in a manner that would not materially delay the progress of work to complete the jet trencher installation procedure. (Certificate Condition 189).

16. The following conditions shall be applied to minimize sediment released into the water column during the Landfall HDD conduit installation:

a. The environmental monitor shall inspect all installation equipment to be utilized at the offshore terminus point of the Landfall HDD prior to use and shall perform periodic inspections of all such equipment no less than once per week when in use.

b. The Certificate Holder shall:

i. only use equipment in good operating condition;

ii. only use equipment fit for purpose;

iii. operate the equipment to satisfy TSS guidance value described in Condition 187;

iv. not use a dragline for excavation;

v. demonstrate to the environmental monitor that the equipment operator has sufficient control over the bucket operation so that the sediment re-suspension from bucket contact with the bottom and bucket over-filling is minimized;

vi. utilize bucket excavation unless bucket excavation would endanger the HDD borehole, in which case the Certificate Holder may use airlift, controlled flow excavation, and/or suction dredging methodologies to install the HDD conduit and the SRWEC-NYS cable; and

vii. during excavation and backfill of at the offshore HDD exit pit, provide to DPS Staff, NYSDEC, NYSDOS weekly progress reports that demonstrate compliance with Certificate requirements and such other information as determined necessary based on consultation with DPS Staff, NYSDEC, and NYSDOS.

c. Certificate Holder may install permanent concrete mattresses or rock bags for protection of the conduit and/or cable within the offshore HDD exit, provided that the Certificate Holder shall cover such protection measures with at least three feet of material excavated from the HDD exit or similar material from upland sources and ensure that there is no discernible depression consistent with Condition 196 (d). Additional details regarding such cable protection measures shall be provided in the EM&CP. Prior to filing the EM&CP, Certificate Holder shall consult with DPS Staff, NYSDEC, and NYSDOS regarding cable protection measures.

d. No later than three months following the Commercial Operation Date, exclusive of the construction windows described herein, Certificate Holder shall determine whether there is a discernible depression at the offshore HDD exits. If there is a discernable depression, the Certificate Holder will timely backfill the HDD exits unless, in consultation with DPS Staff and DEC, it is determined backfill is not necessary. (Certificate Condition 192).

17. The offshore conduit end of the SRWEC–NYS may be exposed or buried by means of hydraulic or mechanical dredging. Material needed for cover of the Landfall HDD conduit end will be placed adjacent to the Landfall HDD conduit location for later use as cover material. Material placement will be done to minimize the footprint of the reverse backfill material and the Certificate Holder will minimize the sediment removed from the offshore HDD exit to the maximum extent practicable. If material to be dredged is contaminated, prior to dredging, the Certificate Holder shall identify the final dredged material disposal location, including a letter from the permitted disposal facility verifying that they will accept the material.

a. All contaminated material shall be handled in accordance with details provided in the EM&CP and below:

   i. only use equipment in good operating condition;

   ii. not use deck barges, unless modified to allow no barge overflow and as approved by the Environmental Monitor and DPS Staff in consultation with NYSDEC;

   iii. use barges or scows of solid hull construction or which are sealed;

   iv. use a closed (i.e., sealed) environmental (e.g., clamshell) bucket with sealing gaskets or an overlapping sealed design at the jaws and seals or flaps positioned at locations of vent openings to minimize sediment suspension;

   v. ensure that seals or flaps designed or installed at the jaws and locations of vent openings tightly cover these openings while the bucket is lifted through the water column and into the barge;

   vi. equip the closed environmental (e.g., clamshell) bucket with sensors to ensure complete closure of the bucket before lifting through the water;

   vii. operate the bucket so as to control the rate of the descent and to maximize the depth of penetration without overfilling the bucket;

   viii. control bucket retrieval rates to minimize turbidity;

   ix. lower the bucket to the level of the barge gunwales prior to release of the load and place the excavated material deliberately and in a controlled manner;

   x. suspend operations until any necessary repairs or replacements are made when a significant loss of water and visible sediments from the bucket is observed;

   xi. avoid washing the gunwales of the scow except to the extent necessary to ensure the safety of workers;

   xii. not overflow the barge;

   xiii. The Certificate Holder shall allow a minimum twenty-four (24) hours of settlement prior to decanting barges. Decanting of barges may not commence until approved by DPS Staff, in consultation with NYSDEC; and

xiv. operate the equipment so as to minimize sediment transport. (Certificate Condition 190).

18. Subject to Condition 128, the environmental monitor(s) shall have stop work authority over aspects of the Project that could violate the terms of the Certificate, EM&CP, or § 401 Water Quality Certification. (Certificate Condition 124).

19. If an HDD exit pit is utilized, within four months of Commercial Operation, the Certificate Holder must submit a report summarizing the results of the construction of the offshore terminus of the Landfall HDD conduit, water quality monitoring, and excavated material management operations. The report shall include:

    a. location and extent of excavation;

    b. total amount of material excavated;

    c. ultimate placement location of excavated material;

    d. water quality monitoring results and corrective actions (when needed) taken; and

    e. documentation of follow-up testing/observations. (Certificate Condition 194).

20. Within four months of completion of the excavation of any offshore HDD exit, the Certificate Holder must file with the Secretary an analysis comparing the actual water quality monitoring results obtained during installation with any model predictions previously provided in support of the Project. (Certificate Condition 195).

21. Relevant Species Related Work Restrictions (Certificate Condition 75).

    a. Atlantic Sturgeon. No in-water seabed disturbing work, including jet trenching trials, but not including installation and decommissioning or operation of the Equipment (as defined in Conditions 75 [d] and 81), shall occur between May 1 to June 30 and September 1 to November 30 in any year to avoid the risk for incidental take of Atlantic Sturgeon, except that the Certificate Holder may be permitted to perform the following, limited seabed disturbing work activities diver clearance and maintenance in HDD exit to locate and prepare HDD conduit end using a crane-deployed, diver-operated jetting tool; cable pull through HDD conduit; and backfill of the HDD exit with sediment or appropriate secondary protection between May 1 through May 15 and November 1 through November 30. In addition, between November 1 and November 30, the Certificate Holder shall be authorized to position and anchor vessels and place the jack-up barge or similar supporting vessel to be used in connection with HDD Drilling Operations,

however the in-water punch out will not occur prior to November 30. If backfill of the HDD exit or remedial burial/secondary cable protection installation and defect remedy occurs during the restricted window (May 1 to June 30 or September 1 to November 30, Certificate Holder shall develop an Atlantic Sturgeon Monitoring and Impact Minimization Plan. Such Atlantic Sturgeon Monitoring and Impact Minimization Plan must meet the substantive requirements of 6 NYCRR Part 182, and shall be included as part of the EM&CP. If applicable, the Certificate Holder shall provide the Atlantic Sturgeon Monitoring and Impact Minimization Plan to NYSDEC 45 days prior to filing of the EM&CP for NYSDEC's review and comment.

b. Winter Flounder: Aside from the activities outlined herein, no in-water seabed disturbing activities shall occur in the ICW between December 15 and May 31 ("Winter Flounder restricted window") in any year. This time of year restriction will not prevent the Certificate Holder from installing or decommissioning temporary, in-water equipment or structures in the ICW (the Equipment, *see also* Certificate Condition 81) to facilitate the construction of the Project within the Winter Flounder restricted window in any year during construction of the Project. If installation or decommissioning of the Equipment occurs during the Winter Flounder restricted window, the Certificate Holder shall develop a Winter Flounder Monitoring and Minimization Plan in consultation with NYSDEC. The Certificate Holder shall provide the Winter Flounder Monitoring and Minimization Plan to NYSDEC 45 days prior to filing of the EM&CP for NYSDEC's review and comment. If, in consultation with NYSDEC, it is determined that the Equipment will result in the take of Winter Flounder, then the Certificate Holder shall implement a Winter Flounder Net Conservation Benefit Plan (NCBP) that meets the requirements of 6 NYCRR Part 182. The Winter Flounder NCBP, if necessary, shall be submitted to NYSDEC for review and acceptance prior to filing with the Secretary and commencement of construction in the relevant area.

22. Exclusive of the portion of the cable installed via HDD, the Certificate Holder shall install the SRWEC–NYS a minimum of six feet (measured from top of cable) below the seabed (Target Burial Depth). Should the Target Burial Depth not be achieved during the initial pass of the cable installation tool that is best suited to achieve Target Burial Depth, the Certificate Holder shall perform up to two additional passes with the installation tool, or other burial tool that complies with the requirements of the Certificate, unless (a) additional passes risk causing damage to the SRWEC–NYS or the installation tool; or (b) due to geologic obstructions, additional passes would not increase the burial depth or risk causing cable exposure (Actual Burial Depth). Certificate Holder shall use best efforts to

micro-route the cable within the cable corridor to achieve Target Burial Depth during installation. If boulders are not identified during pre-construction surveys, and therefore micro-routing the cable is impracticable, the Certificate Holder shall, if required to increase the likelihood of achieving Target Burial Depth, relocate any encountered boulders within 50 feet of the planned centerline of the cable. Where Certificate Holder has relocated a boulder one meter or more in diameter a distance of two meters or more from the location where it was initially encountered, Certificate Holder shall provide electronic notice to mariners, recreational fishermen, and NYSDEC-Licensed Fishermen in accordance with Appendix J. The SRWEC–NYS shall be maintained in accordance with the Cable Monitoring and Management Plan included in the approved EM&CP (Conditions 137 and 138). (Certificate Condition 80).

Certified by:

Date

Chief [INSERT]
Environmental Certification and Compliance
Office of Electric, Gas and Water
New York State Department of Public Service
Three Empire State Plaza
Albany, New York 12223

APPENDIX G

PHASE 1 EM&CP DESCRIPTION

APPENDIX G

PHASE 1 EM&CP DESCRIPTION

I. Phase 1 EM&CP – Scope of Work[1]

a. Establish/Use Laydown Yards:
   i. Expected to have 3-4 sites, including at the Landfall HDD Work Area

b. OnCS - Civil Works:
   i. Remove any remaining materials or structures left at site from prior owner after taking ownership, if any
   ii. Some limited vegetation removal will be required
   iii. Utility tie in works (provide electrical power to site, remove/relocate any utilities per EM&CP)
   iv. Site perimeter security (fencing) will be established
      1. There is an existing chain link fence around the properties. This will be modified to combine into a single project site and improved as necessary per EM&CP
   v. Civil works on site to support OnCS
   vi. Site access will be established with gate, and stone. Any curb cuts necessary will be performed
   vii. Any necessary sediment and erosion controls will be installed per EM&CP and the approved SWPPP
   viii. Grading site; excavations for grounding
      1. Any existing pavement will be removed and disposed of, and foundations or other subsurface obstructions removed and backfilled
   ix. Ground grid will be installed throughout site
   x. Foundation excavation and installation
      1. Excavate, form and pour all foundations and connect to ground grid. Foundations for electrical equipment, building and other support structures will be required, including any ductbanks for cable within the site
   xi. Construction of storage and/or control building shells (2 smaller buildings) may be erected to provide safe indoor storage or work areas

c. Onshore Cable – NYSDOT section: installation of civil works from approximately Waverly Ave to Horseblock Rd on NYSDOT-controlled rights-of-way.
   i. Splice Vault Installation:
      1. Install splice vaults approximately every 2,500 feet
      2. Sawcut pavement, excavate soils. Vault excavations are typically 10’ to 15’ deep

[1] The post-Phase 1 EM&CP(s) will detail the remainder of the Project (*e.g.*, SRWEC–NYS installation).

3. Shoring installed per final detailed engineering specifications to ensure worker safety and protect the excavation. Prepare bottom of excavation with suitable base
4. Place vaults and backfill
5. Place fiber optic handholes in vicinity of vaults
6. Any grounding to be done in accordance with engineering specifications
7. Temporary pavement patch

ii. Ductbank Installation:

1. Sections are expected to be done by crews in smaller work area sections of a few hundred feet at one time.
2. Installation of traffic control and S&E controls as required per EM&CP and the approved SWPPP
3. Sawcut pavement; excavate soils. Ductbank depth along the LIE South Service Road is expected to require a minimum 5' deep cover as required by NYSDOT Standards. Trench supports are installed to ensure worker safety and preserve excavation sides. Tie-in at vaults require deeper installations and gradual sweeps into the vault.
4. Place conduits within trench.
5. Backfill using suitable, thermally approved materials
6. Temporary pavement patch

d. Temporary Equipment Placement and Use:

i. Installation of S&E controls as required per EM&CP and the approved SWPPP
ii. Installation of anchor, spud/pier supports, and floating pier or bridge sections
iii. Shoreline reinforcements – installation of earthen berm, or ramping
iv. Some construction materials and equipment will be mobilized to nearby laydown area

e. Holbrook Substation Expansion: full scope of work as described in the Holbrook Substation Expansion Supplement filed in this docket on April 22, 2022

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APPENDIX H

HDD WORK PLAN SCOPE OF STUDY

APPENDIX H

HDD WORK PLAN SPECIFICATIONS

A Horizontal Directional Drilling (HDD) Work Plan (the Plan) associated with the Sunrise Wind Project (the Project) is to provide details of the anticipated installation methods for each of the HDD proposed for the Project.

The HDD Work Plan also includes procedures and responsibilities for management of inadvertent returns, including the prevention, containment, and clean-up of drilling fluids that could potentially pond on the ground surface or within a waterbody during HDD operations. The Plan will define methodologies to control and minimize the impacts to sensitive resources from inadvertent returns of drilling fluids associated with each proposed HDD. The objectives of the Plan are to:

- Describe the installation methods for each HDD;
- Describe the drilling fluids that will be used for each HDD, including an evaluation of potential hydraulic fracture/hydrofracture;
- Minimize the potential for an inadvertent return event and enable the timely detection of an inadvertent return event;
- Provide for environmental protection of waterbodies and other sensitive resources, in the event an inadvertent return occurs;
- Establish monitoring and response procedures to address containment and clean-up of an inadvertent return event; and
- Establish responsibilities, protocols, and required notification with the applicable parties and regulatory agencies, in the event an inadvertent return occurs.

The complete Plan will be developed upon completion of the engineering and design and will include site-specific information of the three HDD operations, including the Landfall HDD, the Intracoastal Waterway (ICW) HDD, and the Carmans River HDD. The Plan will be included as an Appendix in the Environmental Management & Construction Plan (EM&CP) in accordance with the terms of this Joint Proposal. A table of contents describing the scope of the components of the Plan follows and serves as a specification of what the Plan must include.

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[1] This section will include subsections on drilling fluid composition and processing; drilling functions; controlling and maintaining drilling fluid circulation flow; minimization of environmental impacts associated with drilling fluid flow; spill prevention and containment measures; and inadvertent return prevention measures. This section will include a disposal plan for the drilling fluids, including a management and disposal plan in the event an inadvertent return occurs.

[2] This section will include reference to Safety Data Sheet (SDS) and Water Treatment Chemical Form (WTCF) for the drilling fluids that could be used during construction.

5.2 HDD PILOT BORE OPERATIONS X
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[3] This section will include protocols for monitoring various operational conditions for each HDD, including (a) full fluid circulation; (b) partial loss of drilling fluid circulation; and (c) inadvertent returns of drilling fluid. This section will also include proposed visual monitoring for the Landfall HDD and proposed sampling locations and turbidity monitoring for the ICW HDD and Carmans River HDD. Specifically, this section will detail the Certificate Holder's commitment to utilize one upstream reference location and one downstream location to measure turbidity in the event there is an inadvertent return in Carmans River between March 1st and May 31st due to the Certificate Holder's HDD activity. Similarly, the Plan will detail the Certificate Holder's commitment to utilize one up-current reference location and one down-current location to measure turbidity in the event there is an inadvertent return in the ICW between September 15th and December 15th due to the Certificate Holder's HDD activity.

[4] This section of the Plan will include inadvertent return response for event within onshore wetland or waterbody (e.g., for ICW HDD or Carmans River HDD) or within ocean (e.g., for Landfall HDD). It will also detail containment and clean-up materials and equipment; response close-out procedures; and construction restart procedures. This section will detail the Certificate Holder's commitment to develop a restoration plan, if any inadvertent return occurs within an onshore wetland or waterbody; and to submit this restoration plan to DPS and NYSDEC for review and acceptance prior to implementation.

Figure 1. Preliminary, Theoretical, Recommended Allowable, and Required Drilling Fluid Pressures X

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Attachment A Landfall HDD Installation Plan and Profile Drawings **Error! Bookmark not defined.**

Attachment B Landfall HDD Exit Pit Installation Drawings and Specs **Error! Bookmark not defined.**

Attachment C ICW HDD Installation Plan and Profile Drawings **Error! Bookmark not defined.**

Attachment D Carmans River Installation Plan and Profile Drawings **Error! Bookmark not defined.**

Attachment E Written Analysis of Landfall HDD Route Selection E.1

Attachment F Drilling Fluid Safety Data Sheets and Water Treatment Chemical Forms for Drilling Fluids F.1

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Attachment H Inadvertent Return Report Form H.1

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APPENDIX I

SCOPE OF STUDY: SUSPENDED SEDIMENT AND WATER QUALITY MONITORING PLAN

APPENDIX I

SCOPE OF STUDY: SUSPENDED SEDIMENT AND WATER QUALITY MONITORING PLAN

1.0 Introduction

Suspended sediment and water quality sampling and monitoring (hereinafter referred to as, water quality monitoring) will be conducted in the Project Corridor during seabed preparations, jet trenching pre-construction and construction activities, excavation of the HDD exit, pre-lay grapnel run, cable installation, backfill of the HDD exit, and maintenance and decommissioning activities that involve disturbance of sediments (together, Monitored Construction Activities). Maintenance and decommissioning activities that result in only minor disturbance of sediments, including: (i) anchor sweep; (ii) anchoring; (iii) placement of jack-up barge; (iv) hand jetting; or (vi) other activities as determined by DPS Staff, in consultation with NYSDEC, shall not require water quality monitoring.

Water quality monitoring will consist of collecting water samples for laboratory analysis of turbidity and total suspended solids (TSS) at specified transects and real-time monitoring for turbidity. Turbidity will be measured in the laboratory and in the field (i.e., real time) using optical backscatter (OBS) or similar instruments. Jet trencher trials will be conducted in the portion of the route that is located within New York State (NYS) waters. Trial runs shall evaluate operational control measures such as changing the rate of advancement of the jet trencher; modifying or varying hydraulic jetting pressures; and/or implementing other reasonable operational controls that may reduce suspension of *in-situ* sediments. Water quality monitoring will take place over the entire in-water cable route in NYS waters and for the full duration of the HDD exit excavation works.

A draft "Suspended Sediment and Water Quality Monitoring Plan" (hereinafter referred to as the Plan) shall be provided to the New York State Department of Public Service (DPS), the New York State Department of Environmental Conservation (NYSDEC), and the New York State Department of State (NYSDOS) at least forty-five days prior to filing the Environmental Management and Construction Plan (EM&CP) for review and comment and will be consistent with the Scope of Study presented herein (Appendix I of the Joint Proposal).

2.0 General Sampling and Monitoring Procedures

The physical characteristics of the ambient background water conditions and the sediment re-suspended by the installation equipment will be determined through water sampling at selected transects and subsequent laboratory analysis. Sampling will be conducted down-current of the installation equipment and at an up-current control (*i.e.*, background) station.

TSS and turbidity monitoring will use the up-current and down-current transect approach. Samples will be collected along transects approximately 1,500 feet up-current (or at a reasonably safe survey distance up-current and outside of the effects of cable installation equipment or HDD excavation equipment) and 1,500 feet down-current of the installation or excavation equipment. A

combination of acoustic doppler current profiler (ADCP) and calibrated turbidity instruments will be used to estimate TSS concentrations on selected transects based on the relationship between turbidity and TSS concentration established during pre-activity water quality calibration. Companion water samples will be collected for laboratory analysis of TSS and turbidity. The laboratory derived TSS and turbidity data obtained during the pre-activity water quality calibration will be applied and validated throughout the water quality monitoring program.

An Aquatic Environmental Monitor, as described in the Certificate Conditions, will be present for the duration of the in-water work that requires suspended sediment and water quality sampling and monitoring as described herein.

3.0 TSS Sampling and Monitoring – Calibration and Cable Pre-Installation Trials

A site-specific turbidity-to-TSS calibration will be established prior to the commencement of Monitored Construction Activities. The calibration will feature a correlation analysis of paired turbidity and TSS measurements collected through a wide range of TSS concentration values to create a robust calibration curve. The pre-activity water quality calibration will be conducted in a laboratory and will ensure that real-time turbidity measurements can be converted to TSS concentrations during monitored construction activities.

Representative ambient sediment samples, collected from along the cable route, will be used for the calibration. Ambient sediment will be mixed with ambient seawater to create a minimum of 30 separate water samples with TSS concentrations ranging from 1.0 mg/L to 200 mg/L. For each sample, sediment and seawater will be completely mixed in pre-measured amounts to create a range of TSS measurements (*e.g.*, 1.0 mg per liter of seawater, 5 mg/L, 10 mg/L, 15 mg/L, 20 mg/L, and so on). For each sample, in-situ turbidity will be measured and a grab water sample will be analyzed for TSS concentration. The result will be a large set of paired turbidity and TSS concentration measurements representing the full relevant range of TSS concentrations using site-specific sediment and seawater. The calibration will consist of a regression type analysis. Once calibration procedures have been completed, a calibration curve will be generated and provided to NYSDEC Staff and DPS Staff within the pre-activity calibration report prior to the commencement of Monitored Project Activities. The calibration curve will be updated based on data collected during Monitored Project Activities.

Cable pre-installation trials of the jet trencher equipment will be conducted to simulate cable installation and refine operating configurations. The Aquatic Environmental Monitor will be present during the trials. These trials will be conducted in actual field conditions within representative sections or areas proximate to the proposed underwater cable route in NYS waters. Trial areas will be identified in the Plan. Trials will include approximately 1000 feet of jet trencher operations within sediment types identified to have the potential to result in the highest TSS concentrations and turbidity (*i.e.,* areas observed to have higher percentages of the finer grain sizes such as fine sands and silts). Trials will simulate actual cable installation to design burial depth. Suspended sediment (*i.e.*, the sediment plume) associated with the trials will be monitored using the ADCP, turbidity vertical profiles and water samples. Trials will allow the testing of equipment operational settings in order to minimize resuspension of sediments while achieving target burial depth. In addition, the trials will provide an opportunity to refine suspended sediment monitoring

procedures including validation of acoustic, optical backscatter and water sampling equipment, as well as communication and safety protocols between the monitoring and installation crews. Procedures for TSS monitoring may be modified based on the findings of the pre-installation trial. Modifications may include adjustment of transect locations, number of water samples collected, methods for deploying equipment, and the procedures for correlating water samples with real-time instrument monitoring. Any modification to this monitoring plan must be coordinated with NYSDEC Staff and DPS Staff and then be submitted to DPS Staff for approval.

If the jet trencher trials demonstrate that the preferred operating conditions result in real-time TSS concentrations, measured 1,500 feet down-current of the jet trencher, exceeding the TSS concentrations at an up-current background station by more than 100 mg/L, DPS Staff, NYSDEC Staff, and the Aquatic Environmental Monitor shall be immediately notified and work shall be ceased immediately and then restarted at modified levels that will reduce TSS levels and bring them into compliance with Condition 187 (a). The Certificate Holder will continue to iteratively implement operational controls and measure the resulting TSS. The Certificate Holder will notify the Aquatic Monitor throughout the process about any such operational adjustments.

During implementation of corrective actions, DPS Staff and NYSDEC may specify additional monitoring until compliance with Water Quality Standards is demonstrated. Samples shall be collected until resumption of routine monitoring is authorized by DPS Staff in consultation with NYSDEC. Review of this information by DPS and NYSDEC Staffs shall not unreasonably delay the commencement of installation of the underwater cable system.

4.0 TSS Monitoring – Cable Installation and other Monitored Construction Activities

TSS monitoring will be conducted in accordance with procedures established during jet trencher trials and will be modified as needed during installation operations. Water samples collected for TSS analysis will be sent to the laboratory, and Certificate Holder shall use commercially reasonable efforts to request the most expedited turnaround time, not to exceed 48 hours, available for laboratory samples for locations along the SRWEC–NYS. TSS samples will not be batched since the results will be used during installation to update calibration curves. The calibration curves will be updated based on laboratory results on a daily basis.

Sediment resuspension during cable installation will be monitored along transects oriented perpendicular to the direction of current flow (*i.e.* the TSS plume). The Plan will include a schematic depicting where transects will be located and oriented in relation to the plume and trenching/dredging equipment and will indicate the length and width of the transects. The characteristics of the suspended sediment plume created by jet trencher operations will be monitored in real-time using an ADCP and a turbidity vertical profiler. Water samples for laboratory analysis of TSS will also be collected from a designated location at each transect. The turbidity instruments will be calibrated to estimate suspended sediment concentrations during installation through quantitative relationships between the turbidity and TSS concentration established during pre-activity water quality calibration and updated and refined throughout the installation monitoring. Monitoring of the suspended sediment plume will be conducted during each tidal stage (high water slack, ebb, low water slack, and flood) over a 12-hour period when Monitored Construction Activities are ongoing.

Real-time monitoring will consist of ADCP measurements and turbidity profile measurements taken along transects perpendicular to the direction of current flow (*i.e.*, the TSS plume). The first transect will be conducted approximately 1,500 feet up-current of the operating jet trencher (or at reasonable safe survey distance up-current and outside of the effects of the trencher) to measure ambient or background TSS conditions. The down-current transect will be conducted 1,500 feet down-current of the installation device.

Along each transect, the ADCP will provide horizontal and vertical profiles of current velocities and acoustic backscatter intensity at the point of measurement. At the conclusion of each transect a turbidity vertical profiler will be deployed and collected at the location where the highest acoustic backscatter intensity was observed by the ADCP. Water samples will also be collected at this location for laboratory measurement of TSS from approximately three depths (*e.g.*, near-surface, mid-depth, and near bottom). Water samples will be shipped to a New York State Department of Health Environmental Laboratory Approval Program (ELAP) certified laboratory for analysis of TSS concentration.

If, during monitored construction activities, TSS concentrations monitored or measured at 1,500 feet down-current of the jet trencher exceed TSS concentrations at an up-current background station by more than 100 mg/L at the corresponding depth, DPS Staff, NYSDEC Staff, and the Aquatic Environmental Monitor shall be immediately notified and work shall be ceased immediately and then restarted at modified levels that will reduce TSS levels and bring them into compliance with Condition 187 (a). The Certificate Holder will continue to iteratively implement operational controls and measure the resulting TSS. The Certificate Holder will notify the Aquatic Monitor throughout the process about any such operational adjustments

During implementation of corrective actions, DPS Staff and NYSDEC may specify additional monitoring until compliance with Water Quality Standards is demonstrated. Samples shall be collected until resumption of routine monitoring is authorized by DPS Staff in consultation with NYSDEC. Nothing in this subsection is intended to require that cable installation methods be modified in a manner that would inhibit the cable installer from burying the cable to the depths specified.

5.0 Sampling and Monitoring Schedule

Suspended sediment and water quality field monitoring will be conducted for the duration of monitored construction activities. Monitoring will include daily sampling during each tidal stage (high water slack, ebb, low water slack, and flood) over a 12-hour period when Monitored Construction Activities are ongoing. If sampling results indicate consistent compliance with the TSS standards, the Certificate Holder can submit a request in writing to DPS Staff and NYSDEC Staff to reduce the sampling frequency.

6.0 Reporting

Reporting requirements associated with the suspended sediment and water quality monitoring plan are described below.

Pre-Activity Water Quality Calibration Report

A water quality calibration report will be submitted to NYSDEC Staff and DPS Staff for review more than 15 days prior to commencement of Project activities requiring monitoring. The calibration report will include a description of the ambient sediment, ambient seawater, the sample mixing protocol, and the data analysis protocols applied. The report will present turbidity and TSS measurements, the regression analysis and the resulting calibration curve. DPS Staff will have 15 days to approve the water quality calibration report. Once approved, the report will establish the turbidity-to-TSS calibration that will be applied in real-time to determine water quality compliance.

Jet Trencher Trial Monitoring Memos

At the end of each Jet Trencher Trial day, a brief memo will be submitted for NYSDEC and DPS Staff review. The memo will provide turbidity measurements and TSS measurements (using the pre-activity turbidity-to-TSS calibration) and associated operational adjustments made to achieve compliance (if applicable). In addition, once the TSS laboratory results are obtained, the jet trencher trial paired turbidity-TSS data will be applied to supplement the existing calibration curve. Following completion of the jet trencher trial and receipt of TSS lab results, a final memo will be submitted for NYSDEC Staff and DPS Staff review. The final memo will include a table of paired turbidity and TSS results and a discussion of the process of supplementing the existing calibration using the jet trencher trial data. The final jet trencher trial monitoring memo will be informational and will likely be submitted after the cable burial process is underway.

Cable Burial Monitoring Report

Within four months of the completion of cable burial activities, a comparative analysis will be filed with the Secretary of the NYS Public Service Commission. The analysis will compare the actual water quality monitoring results obtained during installation with any model predictions previously provided in support of the Project. This analysis will include a table and a quantitative analysis (statistical analysis, if possible) comparing the actual and predicted results.

Maintenance and Decommissioning Water Quality Monitoring Plan

Prior to commencing maintenance and decommissioning activities that involve disturbance of sediments, a water quality monitoring plan for activities that may require water quality monitoring will be submitted for NYSDEC Staff and DPS Staff review.

Final Monitoring Report

Within one year of completion of the Monitored Construction Activities, a final report will be prepared that will include a description of procedures followed during the monitoring program, field data results, analytical testing data results, and accompanying quality assurance/quality control data. The final report will include the correlations between turbidity data and corresponding TSS results from water samples. The report will also include a comparison of TSS results to permit-required thresholds and a comparison of water quality results to relevant water

quality standards. The final report summarizing the results of the suspended sediment/water quality monitoring program will be filed with the Secretary of the NYS Public Service Commission.

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APPENDIX J

MARINER NOTIFICATION AND INPUT PROCESS

APPENDIX J

MARINER NOTIFICATION AND INPUT PROCESSES

Sunrise Wind LLC (the Certificate Holder), consistent with the requirements of Condition 61, shall abide by the following notification and public input processes for each of the periods and for the activities delineated below.

I. Documents to be Provided to NYSDEC Licensed Fisherman, the NYSDPS, NYSDEC, NYSDOS, and NYSAGM:

The Certificate Holder agrees to provide documents and other reports to marine commercial fishing license holders (the NYSDEC-Licensed Fishermen), the NYSDEC, NYSDPS, NYSDOS, and NYSAGM consistent with the dates, triggering events, and in conformance with the requirements set forth below. Further the Certificate Holder agrees that the notices and documents provided, as set forth below, will identify and include as appropriate (1) the general dates of work; (2) general types of work (e.g., survey, cable, HDD construction, etc.); (3) the general vicinity of the work, with a National Oceanic Atmospheric Administration (NOAA) work zone chart with coordinates or its closest equivalent; (4) the vessel(s) conducting the work (which are subject to change); and (5) contact information of an employee or agent of the Certificate Holder who will be knowledgeable about the noticed work and able to timely contact the appropriate person(s) conducting the work.

Project Period:	**Document(s) to be Provided:**	**Recipients:**	**Timeframe of issuance:**	**Single Instance or Reoccurring Obligation:**	**Method of Transmission or Submittal**	**Other Requirements or Criteria:**
Within 24 hours of filing the EM&CP	1 copy of the EM&CP	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM	Within 24 hours of filing the EM&CP with the Secretary to the Commission	Single Instance	E-mail	
After the EM&CP has been filed.	Any notice of proposed changes to the EM&CP which have the potential to impact fishing resources or activity	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM	Upon any applicable proposed change to the EM&CP	Reoccurring	E-mail	(1) describe the original conditions and the requested change; (2) state that documents supporting the request are available for inspection at a specified electronic location; and (3) state that persons may comment by writing or calling (followed by written confirmation) to the Commission within 21 days of

						the notification date.
Prior to Commencement of Construction	NOI to Commence Work	NYSDEC Licensed Fishermen and other recipients required by Condition 65	No less than fourteen (14) days before the Commencement of Construction	Single Instance prior to commencement of any approved, phased EM&CP	E-mail and mail to NYSDEC Licensed Fisherman	Provision of the NOI to Commence Work will comply with the Requirements of Condition 65.
During Construction	Status reports indicating construction activities and locations for the following 14 days	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM	Weekly during construction.	Reoccurring	E-mail	Schedule will be disseminated via securite calls on VHF channel 16 at 6 am, 12 pm, and 6 pm to announce intentions for the next 12 hours
Prior and during to any in-water research studies	Status reports indicating study activities and locations for the following 14 days	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM	Weekly during in-water research studies.	Reoccurring	E-mail	Schedule will be disseminated via securite calls on VHF channel 16 at 6 am, 12 pm, and 6 pm to announce intentions for the next 12 hours Provide coordinates for any equipment that will be left on seafloor with anticipated dates

						of deployment and removal
Prior to and during in-water maintenance activities	Notice of in-water maintenance of the SRWEC-NYS indicating anticipated activities and locations scheduled for the following 14 days	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM	14 days before any in-water maintenance activities and once per week thereafter	Reoccurring	E-mail	Schedule will be disseminated via securite calls on VHF channel 16 at 6 am, 12 pm, and 6 pm to announce intentions for the next 12 hours
During Construction	Notice of commencement of any seabed preparation, HDD and HDD exit pit installation and backfill, and cable installation activities, as well as notice of recommencement if activities suspended for more than 14 days.	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM	At least seven days prior to commencement of any seabed preparation, HDD and HDD exit pit installation and backfill, and cable installation activities and again if activities are suspended for more than 14 days.	Reoccurring	E-mail	Schedule will be disseminated via securite calls on VHF channel 16 at 6 am, 12 pm, and 6 pm to announce intentions for the next 12 hours
During Construction and Operations	Notice of cable protection measures	NYSDEC Licensed Fishermen,	Within 10 days of installation	Reoccurring	E-mail	In addition to the reoccurring cable protection notice,

		NYSDEC, NYSDPS, NYSDOS, & NYSAGM; and the public, mariners, and recreational fishermen.	of cable protection			which shall include location and protection type, the Applicant will distribute a comprehensive "Notice of Protection Measures" at the end of construction of the SRWEC-NYS that will include: (i) all cable protection measure locations (including protection type); (ii) any areas where the identified burial depth is less than target burial depth as detailed in the EM&CP; and (iii) any other potential temporary or permanent obstructions caused and/or created by the Project by posting a notice on the Project website,

						which shall include an accessible graphic/geo-referenced repository for all such information.
	NOI for Decommissioning	NYSDEC Licensed Fishermen, NYSDEC, NYSDPS, NYSDOS, & NYSAGM		Single	E-mail to all Recipients and mail to the NYSDEC Licensed Fisherman	Provision of the NOI for Decommissioning will comply with the requirements of conditions 209-210.

II. Notice to Certificate Holder's Project Website

The Certificate Holder agrees to post any and all of the notices described above to its Project Website in conformance with the timelines for issuance, as set forth above.

III. Notice to United States Coast Guard Notice to Mariners

The Certificate Holder agrees to post any and all of the notices described above to the United States Coast Guard (USCG)in conformance with the timelines for issuance and contemporaneous to the service of the above notifications for the USCG to post such notices.

IV. Prior Consultation with Local Mariners

At least 90 days prior to commencing any construction activities in New York State Waters in each construction season, the Certificate Holder will consult with local mariners (i.e., mariners homeported in the communities in the area surrounding the Project) and the executive director of the LICFA or their designee regarding an approximate schedule of activities in New York State Waters and existing uses of the SRWEC-NYS corridor as shown in Appendix B to the Joint Proposal. The Certificate Holder will make good

faith efforts to accommodate those existing uses, including avoiding peak fishing activity to the extent practicable without causing undue delay to the Project's schedule. The results of these good faith consultations will be summarized in a report prepared by Certificate Holder and filed with the Secretary to the Commission prior to the start of each construction season.

V. Requests for Contact Information of New York State Commercial Fishing License Holders:

To facilitate the transmission of notice of upcoming activities including but not limited to survey, study, construction, or other such work, the following outlines the process for soliciting the list of mailing and e-mail addresses associated with NYSDEC-Licensed Fishermen:

i. Beginning one month prior to filing a copy of the EM&CP with the Secretary to the Commission, the Certificate Holder shall make an initial request to NYSDEC seeking the list of mailing and email addresses associated with the NYSDEC-Licensed Fishermen.
ii. On the 1st of every month following the initial request, the Certificate Holder shall request an updated list from NYSDEC. The Certificate Holder shall continue to make the request on the 1st of every month until the Project is energized.
iii. Once the Project has been energized, the Certificate Holder shall request an updated list from the NYSDEC as needed to carry out mariner communications for any post-construction in-water activities. Absent emergent circumstances (i.e., to protect health and safety of persons and property), the Certificate Holder shall make the request for the updated list from NYSDEC at least 14 days prior to any post-construction mariner communication, and the Certificate Holder agrees to utilize the updated list for any post-construction mariner communications.
iv. If NYSDEC fails to provide such notification information within 7 business days of Certificate Holder's request, the last available contact list will be used for notifications and once a new contact list has been provided, that list will be used for notifications

The Certificate Holder acknowledges that the list of mailing and email addresses associated with New York State marine commercial fishing license holders requested from NYSDEC shall remain confidential and must only be used to provide notice to license holders as required by the Certificate Conditions and the processes delineated in this Appendix.

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APPENDIX K

CONSTRUCTION NOISE PLAN

APPENDIX K

CONSTRUCTION NOISE CONTROL PLAN

Sunrise Wind LLC (the Certificate Holder) shall prepare a Construction Noise Control Plan (the Plan) in conformance with the following requirements for inclusion in the Environmental Management and Construction Plan (EM&CP). The Plan shall:

1) Mandate that the Certificate Holder use best efforts to conduct construction activities in accordance with the Best Management Practices set forth below. No deviation from such Best Management Practices shall be acceptable unless the Certificate Holder demonstrates in the EM&CP that it would not be feasible to perform the construction activity in question in accordance with such Best Management Practices.

   a) Using quieter back-up alarms, such as ambient-sensitive or broadband alarms, or an observer to direct a vehicle's rearward motion during the day and replacing back-up alarms with strobe lights for work during 7:00 PM to 7:00 AM, as allowed within federal Occupational Safety and Health Administration regulations;

   b) Assuring that equipment is well maintained, functions properly, and is equipped with noise-reducing devices including mufflers, silencers, covers, and vibration isolators, as appropriate;

   c) Locating especially noisy equipment and storage or laydown areas as far from noise sensitive receptors (NSR) as possible. Whenever possible, the storage of waste materials, earth, and other supplies should be positioned such that these materials also function as a noise barrier;

      - Relocating the noisiest equipment far from NSRs as possible. During the planning stages of the Project, it may be possible to designate storage areas far from NSRs. When this is not possible, the storage of waste materials, earth, and other supplies may be able to be positioned such that they also function as a noise barrier provided this is allowed by government entities, applicable rules, or regulations, if any.

   d) Using quieter construction equipment and methods, as feasible, such as newer equipment and equipment that is appropriately specified for the task;

   e) Prohibiting engine-driven equipment to idle unnecessarily near NSRs;

   f) Using path noise control measures such as portable enclosures for the noisiest small equipment (e.g., jackhammers and saws) where practicable;

   g) Restricting the noisiest operations to normal work hours during the day to the greatest extent feasible, and limiting the periods when construction may occur. The time-of-day restrictions in the Town of Brookhaven noise code (Chapter 50 of the Town of Brookhaven Town Code) shall be complied with, wherever feasible, to minimize impacts to residences; and

h) Informing the public about the time and nature of construction activities. Open communication and providing neighbors with information is a critical step towards minimizing noise impacts to the community. Therefore, abutting owners and residents shall be provided information about the time and nature of construction activities to help minimize the effects of construction noise.

2) In the EM&CP, provide a final noise assessment of the HDD locations, showing equipment layout, equipment noise levels and estimated use, and anticipated levels at nearby receptors.

3) Identify reasonable and safe mitigation measures for each construction activity prior to construction.

4) To the extent that noise mitigation barriers are deemed necessary in the EM&CP, provide the material composition and height of noise mitigation barriers, and ensure that there are no gaps in the barrier and that it is well maintained. Provide the necessary sound transmission Class (STC) and noise reduction coefficient (NRC) for any mitigation barriers required.

5) Specify that nighttime construction noise will not exceed an L_{eq} of 65 decibels on the A-weighted scale during any 15 consecutive minutes (dBA-15-min) or an L_{10} of 70 dBA-15-min at an NSR in a residential area. Specify that daytime construction noise will not exceed an L_{eq} of 75 dBA-15-min or an L_{10} of 80 dBA-15-min at an NSR in a residential area.

6) In the event a noise complaint is made, the Environmental Monitor shall conduct noise measurements at the location of the complaint for 15 minutes according to procedures specified in sections 8.1 through 8.6; 9.1 through 9.2.2; 9.2.4 through 9.4.6; 10, and 11 of ANSI S1.13-2005 “Measurement of Sound Pressure Levels in Air” as applicable and appropriate.

7) If the Environmental Monitor determines that construction noise levels exceed the specified criteria, the Certificate Holder shall employ measures to mitigate the noise levels to the above limits or stop the activity until 7:00 AM, unless operations must be continued (a) for safety reasons; (b) to protect life and/or property; and/or (c) to protect the structural integrity of the bore hole, or to prevent damage to or loss of the bore hole. If noise levels during the activities identified in clauses (7) (a), (7) (b), or (7) (c) exceed noise levels provided herein and lead to a noise complaint two times within 7 consecutive days, all such nighttime activity shall be halted until more effective mitigation measures can be developed and implemented in consultation with the Environmental Monitor.

8) Ensure that the Environmental Monitor shall be available to conduct handheld noise measurements at receptor locations to evaluate noise conditions and determine if corrective measures (additional mitigation measures) are warranted for any construction work.

9) Identify the contents and procedures for communication with abutting owners/residents prior to the construction activities that will extend beyond 6:00 PM (*i.e.*, when the activities will occur, the activity types and duration, and the phone number of the Environmental Monitor) to allow abutting owners/residents to issue complaints or ask questions about the construction activities.

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APPENDIX L

SPECIFICATIONS FOR COMPUTER NOISE MODELING AND TONAL EVALUATION

APPENDIX L

SPECIFICATIONS FOR COMPUTER NOISE MODELING AND TONAL EVALUATION

Sound Modeling and Tonal Analysis

a. Final computer noise modeling shall be conducted by using:
   i. The ISO-9613-2 Sound Propagation Standard with no meteorological correction ("Cmet");
   ii. All noise sources operating at maximum sound power levels;
   iii. A maximum ground factor of G=0.5;
   iv. A factor of G=0 for waterbodies, if any;
   v. A height evaluation of 4.0 meters for all receptors. Single-story buildings may use a height of evaluation of 1.5 meters above the ground;
   vi. A temperature of 10 degrees Celsius and 70% Relative Humidity; and
   vii. At a minimum, the sound results (Broadband, dBA, and at the full-octave frequency bands from 31.5 Hz up to 8,000 Hz dBA will be reported).
   viii. No foliage will be included in the model.

b. Sound modeling results shall conform to the following:
   i. Results shall be included in a report that shall include among others:
      1. Sound results in tabular and graphical format,
      2. the maximum A-weighted dBA Leq (1-hour) sound pressure levels, and the maximum linear/unweighted/Z dB (Leq 1-hour) sound pressure levels from the thirty-one and a half (31.5) Hz up to the eight thousand (8,000) Hz full-octave band, at all sensitive sound receptors (non-participating properties as well as the most critically impacted portion of each external boundary line of the facility site) within the thirty (30) dBA noise contour indicating whether the land use is industrial, commercial, or residential, and comply with all noise limits in the Certificate Order.
      3. A summary of the number of receptors exposed to sound levels greater than thirty (30) dBA reported in tabular format grouped in one (1)-dB bins
   ii. Sound contours shall be legible and rendered above a map that shall include all sensitive sound receptors and boundary lines; noise sources within the substation (including transformers, reactors, HVAC equipment, and other noise sources, if any);
   iii. Sound contours shall be rendered at a minimum, until the 30 dBA noise contour is reached, in 1 dBA steps.
   iv. Full-size, legible digital maps and sound contours at appropriate scale shall be submitted to DPS Staff.
   v. GIS files used for the final computer noise modeling, including noise source and receptor locations and heights, topography, final grading, boundary line, and participating status shall be forwarded to DPS Staff in digital media.

vi. Final computer noise modeling files shall be delivered to DPS Staff by digital means.

vii. Site plan and elevation details of stations, including all relevant noise sources (e.g., shunt reactors, harmonic filters, HVAC equipment, outdoor heating equipment, outdoor coolers, converter water cooling system, ventilation equipment, valve cooling tower, transformers, emergency generator, converter station buildings) as well as cut sheets and technical information from the manufacturers will be included.

viii. Sound power level information from the manufacturers or as obtained from pre-construction field tests for all noise sources. (Supporting information from the manufacturer or the field tests will be provided).

1. Converter station buildings: Derivation of sound power levels for the buildings based upon sound power level information for indoor noise sources, building dimensions, interior absorption coefficients, and transmission losses of envelope materials or sound testing on similar buildings, will be provided.
2. If no sound information for electric transformers from the manufacturers is available, sound power levels can be estimated by using the algorithms recommended by the Electric Power Plant Environmental Noise Guide (Volume 1, 2nd edition. Edison Electric Institute. Bolt Beranek and Newman Inc. Report 3637. 1983 Update). General dimensions and NEMA ratings will be reported.
3. If no manufacturer's information is available, sound information can be based on field test(s). The field test(s) will report, at a minimum, sound pressure and sound power levels and clear explanations about how the test was conducted and Sound Power Levels were obtained.

ix. If mitigation measures are needed, details such as dimensions, appropriate clearances, and specifications (e.g. for sound walls, barriers, mufflers, silencers, enclosures) will be included. Mitigation, if needed, will be implemented before the start date of operations.

c. For Certificate Conditions that impose a tonal penalty and for receptors that approach any sound limit within 5 dBA, a prominent tone analysis will be presented subject to the following requirements:

i. The "prominent discrete tone" constant level differences (Kt) in ANSI S12.9-2013/Part 3 Annex B, section B.1, will be used as follows; 15 dB in low-frequency one-third-octave bands (from 25 up to 125 Hz); 8 dB in middle-frequency one-third-octave bands (from 160 up to 400 Hz); and, 5 dB in high-frequency one-third-octave bands (from 500 up to 10,000 Hz).

ii. The assessment may use pre-construction residual sound levels to determine whether any tones are expected to be audible and prominent. In this case, the provisions of section 9 (c) of the Sound Testing Protocol will be used as applicable. In summary, the spectrum to be evaluated for the presence of prominent discrete tones will be the total sound level at the most critical noise sensitive receptors, calculated as the incoherent sum of the existing lowest residual $L_{90\text{-}1\text{-}hour}$ one-third octave band sound level obtained from a seven-day-long field survey that generally follows ANSI/ASA S3/SC1.100-2014-

ANSI/ASA S12.100-2014[1] and the equivalent continuous sound pressure level (L_{eq}) at such receptor from all noise sources of the converter station as obtained from the computer noise model. The analysis will use one-third octave band information from the manufacturers or field tests (from 20 Hz up to 10,000 Hz).

iii. For the purposes of tonality assessment, calculations will include the following Attenuations as specified in ANSI/ASA S12.62/ISO 9613-2: 1996 (MOD). Acoustics – Attenuation of Sound During Propagation Outdoors-Part 2: General Method of Calculation:
   1. Attenuation due to geometrical divergence (Adiv),
   2. Atmospheric absorption for a temperature of 10 degrees Celsius and 70% Relative Humidity (Aatm),
   3. Attenuation due to the ground effect (Agr),
   4. Attenuation due to a barrier (Abar) if any,
   5. No miscellaneous attenuations (Amisc) will be included.

iv. If no manufacturer's information or pre-construction field tests are available to demonstrate that noise sources are not tonal as defined herein, sounds will be assumed to be tonal and the broadband overall (dBA) noise level at the evaluated position as determined with computer noise modeling shall be increased by 5 dBA for evaluation of compliance with applicable Conditions of the Order.

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[1] Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas.

APPENDIX M

SOUND TESTING COMPLAINCE PROTOCOLS

APPENDIX M

SOUND TESTING COMPLAINCE PROTOCOLS

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1) BACKGROUND

2) SOUND INSTRUMENTATION

a) Sound Level Meters (SLMs): All sound level measurements will be conducted using Type-1 integrating SLMs that meet the requirements of ANSI S1.43-1997(R 2007) "Specifications for Integrating-Averaging Sound Level Meters" and/or ANSI/ASA S1.4-2014 / Part 1 / IEC 61672-1-2013.

b) One-Third Octave Band Analyzers: The instruments will have Class-1 one-third octave-band analyzers that meet ANSI S1.11-2004 (R2009) "Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters". Alternatively, the instruments will have Class-1, one-third octave-band analyzers that meet ANSI S1.11-2014/ Part 1 / IEC 61260-1: 2014.

c) Acoustical/field calibrators: Any acoustical calibrator will be a Type-1 precision calibrator that meets the requirements of ANSI S1.40-2006 (R2011) "Specifications and Verification Procedures for Sound Calibrators".

d) Windscreens: The windscreens will be clean, dry, and in good condition. Seven inch (7-inch) diameter windscreens or equivalent will be used. Measured sound levels will be automatically corrected by the SLMs or manually corrected as relevant for the insertion loss caused by the windscreen. Insertion losses for windscreens will be documented and included as an appendix to the report as specified in section 14(b) of this protocol. The 7" diameter wind foam screens can be used with secondary windscreens (e.g. 300 mm) or single wider foam windscreens can be used (e.g. 300 or 400 mm rhombicuboctahedron windscreens), to reduce the influence of wind noise.

e) Sound Floor: SLMs will have a sound floor or self-generated noise (combined - electrical and thermal- microphone and preamplifier noise) at least 5 dB below the sound pressure levels that are intended to be measured at each one-third frequency band of interest as specified in section 3(c) of this protocol. Alternatively, SLMs will have self-generated noise levels (Combined-electrical and thermal-microphone and preamplifier noise levels) lower than or equal to 22 decibels for broadband descriptors and lower than or equal to 10 decibels for all one-third frequency bands of interest. Sound floor characteristics will be documented with information from the manufacturer. When this is not available, sound floor characteristics may be documented with the most recent certificates of calibrations, provided the information was obtained and reported by an independent qualified laboratory. If this information is also unavailable, sound floor may be estimated by measuring sound levels with the SLM running in a very quiet condition such as inside an SLM hard case or inside the calibrator with the calibration tone "off," at an indoor quiet location.

f) Dynamic range: The dynamic range of SLMs will be properly selected (manually or automatically) to avoid any noise floor and overload issues.

g) Temperature and Humidity: SLMs will have operating temperature and relative humidity ranges that comply with the standard listed in section 2(a) of this protocol and are expected to cover the estimated temperature and relative humidity conditions of the site during testing. If this is not possible, testing days and times with forecasted temperature and relative humidity values within the range of the SLMs will be selected. The temperature and humidity ranges from the SLM manufacturer will be reported.

h) Tripods: SLMs will be mounted on tripods, stakes or poles. Operators, if present, should be at least 1.5 meters (5 feet) away from the sound microphone during testing.

3) NOISE DESCRIPTORS, WEIGHTING, RESPONSE, AND OTHER SETTINGS

a) Broadband Descriptors: The sound levels of the Leq, Lmax, Lmin, L10, and L90 broadband descriptors at the residential positions shall be recorded and reported as an appendix to the sound compliance test report for informational, corroboration, or audit purposes. Additional broadband descriptors may be collected but are not required.

b) One-Third Octave Band Descriptors: The Leq and L90 noise descriptors shall also be recorded at selected residential positions for the One-third octave bands of interest (as specified in section 3(c) of this protocol) and included in the sound compliance test report.

c) Frequency Ranges of Interest: All one-third octave band measurements will include the frequencies from 20 Hz Hz through 10,000 Hz. Any full octave band measurements will include the frequencies from 20 Hz through 8,000 Hz.

d) Weighting: Broadband sound levels shall be reported by using the A- weighting scale in the frequency range of interest. Full octave bands and one-third octave band levels shall be reported by using the Z, Linear or un-weighted scale.

e) Statistical Noise Descriptors Response: The response for determination of any statistical noise descriptors will be set to “Fast”.

f) Settings: All SLM settings will be reported.

4) CALIBRATION REQUIREMENTS

a) Laboratory Calibration: Each SLM and calibrator will have undergone laboratory calibration within two years prior to its use for any sound compliance test. Copies of the calibration certificates will be included as an appendix to the sound compliance test report.

b) Field Calibration: If operators are present, the SLMs will be acoustically calibrated (sensitivity check) in the field at a minimum immediately before and after the operational and the background sound testing period, according to the procedures given

in the SLM instruction manual.

c) Field calibration differences:

i) If the calibration level after a sound collection differs from the previous calibration level by ±0.5 dB or less, all measurements made with that system shall be adjusted by one-half of the difference. Differences lower than or equal to 0.2 dB are exempt.

ii) Collected data with a difference between the initial and the final calibration exceeding ±0.5 dB will not be used, and sound collections performed showing such difference will be repeated. In such cases, equipment shall be checked.

iii) Any difference between the acoustical calibrator reference sound level and the SLM calibration reading will be reduced to zero by adjusting the SLM sensitivity in the field, prior to any sound collection.

iv) The calibration sound level results will be documented and reported.

5) WEATHER AND TESTING CONDITIONS

a) Sky cover and solar radiation or cloud height will be documented with weather information from the most representative (as related to those conditions at the Facility site) National Weather Station or airport's weather advisory service.

b) All meteorological parameters of wind speed, wind direction, temperature, relative humidity, precipitation, and atmospheric pressure (optional) will be evaluated at a minimum at one location on site with, at a minimum, one portable weather station. Wind speed will be measured at 2 meters ±0.20 meters above the ground at all locations to be tested. Accuracy (or maximum margin of error) will be ± 10% of full scale for the anemometer (but not greater than ±0.7 mph), ± 3° for the compass, ± 5% of full scale for thermometer (But not greater than ±1 ºF), and ± 5% for hygrometer. Continuous logs of 1-minute intervals will be collected and reported.

c) Wind speed will also be measured at all selected residential positions with handheld weather meters or anemometers. Accuracy will be as specified for the continuous portable meteorological station or better.

d) Wind speed will be reported for the beginning and the end of each background and operational testing period and periodically at the residential positions tested. Sky cover and general weather conditions will be observed and reported.

e) Portable weather stations will be located close to the sound microphones, as far as practical from any wind obstructions or vegetation that may affect the wind speed measurements.

f) Nighttime sound testing will be conducted at wind conditions that are favorable for accurate measurements as defined in ANSI S12.18-1994, method #2. This includes downwind conditions with wind speed between 1 and 3 meters per second or alternatively average wind speed lower than or equal to 1 meter per second (2 mph) measured at a height of 2 ± 0.2 meters above the ground elevation at any wind direction. Reasonable efforts will be made to schedule sound tests during a period of time when calm wind conditions (lower than or equal to 3 mph) are forecasted.However, if the expected worst operational noise emissions described in subsections 5(i) and 8(d) are not achieved, testing can be conducted at wind conditions that are favorable for routine measurements as defined in ANSI S12.18-1994, method #1. This includes downwind conditions with wind speed between 3 and 5 meters per second measured at a height of 2 ± 0.2 meters above the ground elevation.

g) Downwind conditions exist when the wind direction is within an angle of ± 45° of the direction connecting the of the acoustic center of the Onshore Converter Station (OnCS–DC) and the center of the specified receiver, with the wind blowing from source to receiver.

h) Dominant sound sources are defined as the sources that produce the maximum sound pressure level contribution at the position to be evaluated. In cases where the most prominent sources are difficult to discern (as related to the noise limit(s) to be evaluated (e.g. Leq-1-h, low-frequency sounds), it will be identified with computer noise modeling or calculations.

i) Evaluation of maximum short-term noise limits from the Onshore Converter Station (OnCS–DC) will be conducted under the expected worst operational noise emissions (maximum sound power levels) described in this Protocol.

j) Sound testing will not be conducted during adverse weather conditions such as average upper wind speeds exceeding 3 meters per second, rain, thunderstorms in the vicinity, snow fall, or under wet road conditions. Any data collected under these conditions will be discarded.

6) TESTING POSITIONS

a) Sound testing will be conducted at a minimum of two (2) most potentially impacted positions (on private spaces -if access to the property is granted or public space) considering anticipated sound impacts from computer noise modeling results, any preliminary measurements, and complaints, if any.

b) Positions to be tested will be selected by New York State Department of Public Service (NYSDPS) Staff (NYSDPS Staff) within 60 days after the start of commercial operations of the Onshore Converter Station (OnCS–DC).

c) Sound microphones will be located at a height of 1.5 +/- 0.1 meters above the ground.

d) Final sound measurement positions will be selected to:

i) Minimize the influence of traffic noise from local roads. Measurement positions should be no closer than 15 meters (50 feet) from the center of any roadway, unless it is not possible to obtain permission from property owner(s) to collect sound information within the private property. In this case, measurement positions can be adjacent to the road, in the public right-of-way. Sound measurements shall be paused, inhibited or excluded during any vehicle or airplane pass-by.

ii) Avoid or minimize the influence of any mechanical or electrical noise sources from any private or public spaces such as air conditioners, air condensers, heaters, boilers, fans, pumps, transformers, lighting, etc.

iii) Avoid or minimize the influence of sounds from water streams.

iv) Provide a clear sight view of the noise sources where possible and minimize the effect of any sound obstruction.

v) Minimize the influence of reflections of any buildings and other small reflective surfaces as follows:

(1) Sound microphones shall not be located closer than 7.5 meters (25 feet) from any reflective surface other than the ground.

(2) Sound microphones shall not be located closer than 1.5 meters (5 feet) from any reflecting object with small dimensions such as small trees, posts, bushes, etc.

e) Positions selected will be identified by the Certificate Holder with satellite pictures and coordinates and forwarded to DPS for final review. Upon approval by NYSDPS Staff of residential positions to be tested, the Certificate Holder will contact the landowner(s)/tenants(s) to request permission to collect outdoor sound readings close to their residences within the private properties if necessary. If permission is not granted or obtained or necessary, sound measurements can be obtained on public space or an alternate proximal residential position, with the approval of NYSDPS Staff.

f) At its discretion, NYSDPS Staff can conduct with its own instrumentation, or request the Certificate Holder to conduct with their instrumentation, sound testing at any existing residential location, during the test (subject to the Certificate Holder's ability to obtain landowner consent, if applicable, and subject to equipment and personnel availability).

g) All collections at a specific residential position will be performed by using the same

instruments that were used at that specific location at the beginning of the test including the SLM, acoustical calibrator and weather/wind meter. A specific location shall not be tested by using two different SLMs, acoustical calibrators, weather or winds speed meters, unless this is necessary to complete the measurements at that location after an instrument starts malfunctioning or fails during the test.

h) Operational Sound Monitor Positions:

i) Sound testing will also be conducted at the locations of the Onshore Converter Station (OnCS–DC) boundary lines where operational noise is expected to be greatest.

ii) In addition, to demonstrate compliance with limits at the boundary lines, these monitoring locations can be used to document operational and background sound levels during the sound compliance tests for corroboration or audit purposes, determine whether a transient sound event at residential positions was caused by noise sources within the Onshore Converter Station (OnCS–DC) or not, as feasible, and potentially assisting with analyzing the data collected at residential positions, if needed.

iii) Data collected at boundary lines of the Onshore Converter Station (OnCS–DC) will be compared to and evaluated for compliance with any noise limits set by the Certificate Conditions of the Certificate Order.

7) SEASONS AND TESTING TIMES

Pursuant to Certificate Conditions of the Order:

a) The OnCS-DC Site shall be evaluated by the Certificate Holder by following the provisions and procedures for post-construction noise testing will be required performance evaluations included in the Sound Testing Compliance Protocol (STCP), Appendix M, after the commercial operation date of the OnCS-DC Site.

b) Within seven (7) months after the commercial operation date of the OnCS-DC Site, the certificate holder shall perform and complete at least one sound compliance test and the results shall be submitted by filing with the Commission a report from an independent acoustical or noise consultant, no later than eight (8) months after the commercial operation date, specifying whether or not the OnCS-DC Site is found in compliance with all certificate conditions on noise.

8) MEASUREMENT PROCEDURES

Procedures will be as follows:

a) Data Collection Procedure for Operational Sound Testing (All Noise Sources ON plus

background sounds):

i) Check SLMs calibration. Set any difference to zero at the beginning of the sound survey.

ii) Verify that at a minimum, all noise sources within the Onshore Converter Station (OnCS–DC) are turned "ON" and stay in operation during testing.

iii) Report the time that the measurement is started. If operators are present external transient background sounds will be excluded by inhibiting data collection as stated in this section. Sound collections can be restarted or continued after the transient sound ceases.

iv) Complete one 10-minute cumulative collection. Record and report the time at which each measurement is concluded.

v) Continue with another 10-minute collection until at least three 10-minute valid samples are collected.

b) Data Collection procedures for background sound test at a proxy location: Since most noise sources of the Onshore Converter Station (OnCS–DC) cannot be turned-off to measure background sounds, a proxy location will be selected. The proxy location should be located far from the influence of the noise from the Onshore Converter Station (OnCS–DC), at a location with similar soundscape and ground type as the location(s) that is(are) intended to be tested. At this point, a position at Trail Blazer Ct, located at approximately the same distance between the Interstate I-495 and the receptors to be evaluated seems to be one of the best options. Background and operational sound testing will be performed simultaneously. The procedure will be the same as indicated in subsection 8(a) above.

c) Time definitions:

i) the daytime is the time between 7:00 a.m. and 10:00 p.m. EST; and

ii) the nighttime is the time between 10:00 p.m. and 7:00 a.m EST.

iii) Testing will be conducted during minimal nighttime background sound conditions, between 10:00 p.m. and 7:00 a.m. If a violation or non-compliance situation is found in another time frame, any test or retest may need to be conducted to cover approximately the times of the day when the violation or non-compliance situation was found.

d) Duration of measurements:

Measurements for evaluation of short-time noise descriptors (Leq-1-h,) will be collected over a minimum period of half hour or until valid data is achieved so that all receptors are evaluated during a period in which facility operation may be

expected to produce maximum sound power levels from the noise sources, subject to wind speed and direction restrictions and other provisions in this protocol so that compliance or violation with Certificate Conditions on noise can be evaluated.

e) Transient Sounds

i) Testing will be conducted during periods of minimal influence from sources of background sounds external to the Onshore Converter Station (OnCS–DC) site. Exclusion of transient sounds is limited to external sound sources other than the Onshore Converter Station (OnCS–DC)'s noise. Transient noises produced within the Project site will not be inhibited at the time of testing.

ii) Transient sounds will be excluded by operators present or by post processing of the data.

iii) For the purposes of this testing, the following sounds will be considered transient:

1) Sounds that are infrequent and not part of the continuous background as specified in ANSI/ASA S12.9 2013/Part 3.
2) Identifiable sounds caused by local traffic (e.g. cars, trucks, motorcycles, planes, trains and any means of transportation) (not distant traffic or traffic that is part of the continuos background)
3) Identifiable sounds caused by human activity (e.g. conversations, shouting, music, use of any sound or mechanical equipment).
4) Identifiable sounds caused by animals such as dogs, birds, peepers and insects. When animal sounds are unavoidable (such as insect sounds during the summer) instruments may not need to be paused, provided the sounds can be filtered by post-processing as specified in this protocol.
5) Transient sounds inhibited during operational sound testing will also be inhibited during background sound testing should they occur. SLMs will have means to inhibit data collection whenever a transient background sound occurs. Operators will pause or hold the sound collection while transient sounds occur and reset or continue the measurement after the transient sound has ceased.

iv) If operators are present, trigger cables are preferred so that operator's sounds and reflections are minimized.

v) SLMs with "delete-back" capabilities are also preferred. If SLMs with "delete-back" capabilities are used, the SLMs can be set up to a maximum deletion of a 10-second sound reading interval.

vi) Sound collection can be restarted or continued after the transient sound ceases.

vii) If operators are present, the Certificate Holder will ensure that personnel are qualified and properly trained to exclude transient events as specified in this protocol so that the need for post-processing is avoided or minimized.

9) BACKGROUND CORRECTIONS AND ANALYSIS OF RESULTS

No corrections for background sounds are necessary if operational sound test results (with the noise sources ON plus the background sounds) comply with certificate conditions in the Order.

a) SHORT-TERM NOISE LEVELS AT RESIDENTIAL POSITIONS.

i) The fractional-band Leq 10-minute background sound levels will be logarithmically subtracted from the fractional-band Leq 10-minute operational sound levels (Onshore Converter Station (OnCS–DC) sound sources ON plus background) for each measurement position in order to determine the Onshore Converter Station (OnCS–DC) contribution to the total A-weighted sound levels. The "exact equation" (Equation 8), as contained in Note 2 of section 6.9 of ANSI/ASA S12.9-2013/Part 3, will be used to calculate the correction applied to each frequency band. . Except for evaluation of prominent tones, the A-weighted, noise compensated sound level (ANS-weighted metric) as specified in ANSI/ASA S3/SC1.100-2014 ANSI/ASA S12.100-2014 will be used[1]. If insect, bird, animal, and/or leaf rustle sounds were present, they will be excluded from the measurements by correcting the applicable one-third frequency band sound levels at the frequencies where they occurred as appropriate. Background and operational sound levels will then be recalculated to obtain both background and operational overall Leq (ANS) 10-minute corrected sound levels. Both raw and corrected data will be reported with explanations.

ii) If the arithmetic difference between the operational sound levels (Onshore Converter Station (OnCS–DC) noise sources turned ON plus background sounds) and the background sound levels (at the proxy location) is less than 3 dB, the calculated result will be reported, and a "n/a" note will be added.

iii) Leq-1-h levels will be calculated as the energy-based average of a minimum of three and a maximum of six Leq-10-minute samples.

iv) Operational noise levels from the Onshore Converter Station (OnCS–DC) only (Leq 1-h), at the selected residential positions (after background corrections are applied), will then be evaluated for compliance with Certificate Conditions of the Order.

b) PROMINENT TONES:

i) Prominent tones will be defined as follows: A prominent discrete tone is identified as present if:

1) The time-average sound pressure level (Leq) in the one-third-octave band of interest exceeds the time-average sound pressure level (Leq) in both adjacent

[1] ANSI/ASA S3/SC1.100-2014-ANSI/ASA S12.100-2014. Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas.

one-third-octave bands and the threshold of hearing (as indicated in Table 1 of this protocol); and,

2) The time-average sound pressure level (Leq) in the one-third-octave band of interest exceeds the arithmetic average of the time-average sound pressure level (Leq) for the two adjacent one-third-octave bands by any of the following constant level differences:

a) 15 dB in low-frequency one-third-octave bands (from 25 up to 125 Hz); or
b) 8 dB in middle-frequency one-third-octave bands (from 160 up to 400 Hz); or

c) 5 dB in high-frequency one-third-octave bands (from 500 up to 10,000 Hz).

ii) Prominent tones will be evaluated by using the Leq-10-min sound level results (linear, Z or un-weighted). All collected data will be reported.

1) The one-third octave band operational sound levels measured at each residential position will be evaluated, to determine if any prominent tones as defined herein were present during testing and caused by operation of the Onshore Converter Station (OnCS–DC).

a) Initially, no correction for background sounds will be applied to the operational sound results for this evaluation.

b) If any prominent tones are found, the operational sound pressure levels of the 1/3-octave bands containing the tones will be evaluated to determine if they exceed the values listed as hearing thresholds in Table 1 of this protocol for the respective frequencies. If they exceed the values, the prominent tones will be denoted as audible and the opposite will be denoted as inaudible. Operational prominent tones that are found being inaudible will be reported as such and may not require further analysis.

c) If any prominent tones are found to be audible:

1) The background sound levels Leq will be evaluated to determine if the prominent tone was caused by other sound sources in the background rather than noise sources from the Onshore Converter Station (OnCS–DC). The results of this evaluation will be reported.

2) The operational sound levels will then be corrected by using the exact equation listed in note 2 of section 6.9 (equation 8) of ANSI/ASA S12.9-2013/Part 3 to determine operational sound levels from the Onshore Converter Station (OnCS–DC) sources only (Operational sound levels minus background sound levels). If the difference between an uncorrected operational sound level (Onshore Converter

Station (OnCS–DC) sound sources ON plus background sounds) and a background sound level is lower than 3 dB the operational sound level from the Onshore Converter Station (OnCS–DC) sources only (background corrected) will be set equal to -99 dB for subsequent calculations (as recommended by section 6.9 d. 1 of ANSI/ASA S12.9-2013/Part 3) and reported with an "n/a" note. Operational noise levels from the Onshore Converter Station (OnCS–DC) noise sources only (background corrected) will then be evaluated for prominent tones. Results will be reported.

3) If any prominent tones are found, the operational sound levels from the Onshore Converter Station (OnCS–DC) sources only (background corrected), will then be re-evaluated to determine whether or not the prominent tones are caused by the application of background corrections. In this case, the operational sound level from the Onshore Converter Station (OnCS–DC) noise sources only (Background corrected) at each one-third frequency band of interest will be evaluated for audibility (as specified in section 11.b.3.ii of this protocol) and if found audible, it will be compared to the arithmetic average of the uncorrected operational noise levels (sources ON plus background sounds) of the two adjacent one third octave bands. Results will be reported.

2) If any audible prominent tones are found at any evaluated residential positions and if they are found to be produced by the operation of the Onshore Converter Station (OnCS–DC), broadband Onshore Converter Station (OnCS–DC) operational noise level results for that/those position(s) (Leq (A)-1-hour) will be evaluated for compliance with Certificate Conditions of the Order.

3) Comments about whether or not the Onshore Converter Station (OnCS–DC) is found in compliance with the audible prominent tone condition of the Order will be included in the report.

10) ADDITIONAL TESTING

This protocol reflects the minimum requirements contemplated for the compliance sound tests required by the Order. If additional testing is required, those tests will be performed by following all the provisions of this protocol except as follows:

a) If a violation or non-compliance situation is found at any residences not previously evaluated, those positions will be added to the tests.

b) Seasons and testing times: If a violation or non-compliance situation is found in a specific time frame any retest may need to be conducted to cover approximately the times that the violation or non-compliance situation was found.

c) Scenarios to be tested: The Onshore Converter Station (OnCS–DC) will be retested at approximately the same operational and weather conditions at which the non-compliance situation or violation was found.

11) ADDITIONAL PROVISIONS

a) A test plan will be developed by the Certificate Holder for their employees/consultants as recommended by section 9.1.4 of ANSI S1.13-2005, prior to the test.

b) A final testing schedule will be provided to NYSDPS Staff prior to deployment. NYSDPS Staff will be notified of any changes to test procedures prior to or during the test, if they occur.

c) To avoid sound interruptions during testing, if communication equipment is used, it will not be operated on speaker/loudspeaker settings and will preferably be set with freehand earphones/microphones. All staff members and personnel will take proper actions to ensure that conversations and communications will not affect the sound collections.

d) All clocks, including any SLMs and weather station meter clocks will be synchronized with the Onshore Converter Station (OnCS–DC) operational time. Any difference between the Onshore Converter Station (OnCS–DC) operational time and the official Eastern Standard Time will be noted and reported.

e) Sound testing will be conducted at each selected residential position over consecutive 10-minute periods for the operational sound tests and the background sound tests.

12) WITNESSING AND NOTIFICATIONS

a) At the discretion of NYSDPS, NYSDPS Staff representatives may be assigned to witness any sound test.

b) At the discretion of the NYSDPS, sound collections can be performed by NYSDPS Staff with NYSDPS instrumentation at any time, location and operational condition. In those cases, NYSDPS testing will comply with the requirements identified in section 2 of this protocol.[2] NYSDPS at its discretion can collect any information related to sounds from the facility and the environment, and weather conditions, including but not limited to any sound levels by using any metric or sound descriptor.

[2] For instance, while the Certificate Holder is required to test at a minimum two locations and demonstrate compliance with all Certificate Conditions of the Order, DPS may only need to test one location or to investigate a violation of one or a few, but not all Certificate Conditions. Other exceptions are the ability to test the facility at any time, location, operational condition, weather conditions, metric and sound descriptor rather than the ones specified in this protocol. For compliance or violation purposes, however, only the metrics and sound descriptors specified in the Certificate Conditions of the Order will be used.

c) If the facility is required to conduct testing of the Onshore Converter Station (OnCS–DC) at a specific operational condition that would require the Certificate Holder to modify the operation of any Onshore Converter Station (OnCS–DC) equipment or setting any Onshore Converter Station (OnCS–DC) equipment online or offline, NYSDPS Staff shall coordinate with the Certificate Holder at least five (5) business days in advance of such testing. This advanced notice and coordination is required so the Certificate Holder can, among other things, ensure: Onshore Converter Station (OnCS–DC) and operational conditions are in-order for testing; that any impact to its customers will be minimal; and that the Certificate Holder, and its customers, can properly notify staff to accommodate the service interruption, and subsequent restoration, if any. If NYSDPS Staff desire to conduct sound or vibration testing from the Onshore Converter Station (OnCS–DC) and no modification to operational conditions of Onshore Converter Station (OnCS–DC) equipment are required, no prior coordination is required.

d) The Certificate Holder will coordinate with NYSDPS Staff at least five (5) business days in advance of a tentative date for any sound tests.

e) The Certificate Holder will coordinate with NYSDPS Staff on a final date at least two (2) business days prior to any sound tests.

f) The Certificate Holder will notify Town officials and applicable residents about the final dates and times of the compliance tests.

13) REPORTING AND DOCUMENTATION

A report will be prepared that includes at least the following analyses and documentation:

a) A listing of make and model for each SLM, acoustical calibrator, weather station, weather handheld meter and anemometers (with corresponding serial numbers), and identifying which positions each instrument was used at, along with copies of laboratory calibration certificates for SLMs and calibrators, and any field calibration results (Sensitivity checks). SLM specifications including type, sound floors, humidity and temperature ranges, and settings will be included in the report along with a statement about whether the SLMs and calibrators had undergone laboratory calibration within two years prior to its use in the test. Accuracy for portable weather stations, handheld meters and/or anemometers will be documented along with a statement about whether the portable weather station and the hand-held meters or anemometers used for the tests comply with the accuracy requirements specified in this protocol;

b) The insertion loss of the windscreen as stated by the manufacturer or accredited independent laboratory, for the fractional bands of interest specified in section 3(b) of this protocol, and whether or not the insertion loss values in dB have been automatically or manually applied to the reported data;

c) The names and qualifications of all personnel who conducted and/or provided direct oversight during the testing. Operators shall be knowledgeable with respect to the operation, performance capabilities and limitations of sound and weather instrumentation, and the specifics of this protocol;

d) All logged A-Weighted (dBA) broadband Leq, Lmax, L10, and L90 data measurements and results by electronic or digital means. If results are corrected, filtered or post-processed, both raw and corrected data will be reported;

e) All logged one-third octave band data and full octave band results for the Leq;

f) All measured and logged data will be reported to the nearest tenth of a decibel in digital and graphical format. Spreadsheet compatible files will be provided by electronic or digital means;

g) Sound measurements and calculations of sound levels shall be reported to the nearest 1/10 of a dB;

h) Field data sheets and notes;

i) Meteorological conditions during testing: The report shall include the continuous log of all measurements of meteorological conditions collected including average wind speed and wind direction on the ground and upper elevations, ambient air temperature, relative humidity, barometric pressure (optional) and rain fall (precipitation). Sky cover and general weather conditions will be reported;

j) Broadband and fractional band results by electronic or digital means;

k) Evaluated residential and any sound monitor positions including GPS coordinates and approximate distances to the Onshore Converter Station (OnCS–DC) along with photos and a description of the state of vegetation and whether or not the most relevant, proximal noise sources are visible from the sound microphone positions;

l) Height of sound microphones as related to the ground along with photos of the residential locations being evaluated and an identification of the number of stories;

m) Figures depicting the sound testing positions in relation to the Onshore Converter Station (OnCS–DC), property lines, roads and the existing residences as of the date of the Order that were evaluated with the test. Other existing non-residential buildings will be included for reference only;

n) A complete log of the operational load and operational conditions from the Onshore Converter Station (OnCS–DC) and all its relevant noise sources, if available, during testing periods. Statements about whether the operational conditions during testing comply with the requirements of this protocol will be included. Any difference between

Onshore Converter Station (OnCS–DC)'s and Eastern standard time will be reported; and

o) An analysis of results including overall sound levels, prominent tones and low frequency noise levels and whether they were found to comply or exceed the applicable Certificate Conditions at any selected residential position and whether or not additional mitigation measures are necessary to comply with Certificate Conditions.

14) TERMS AND DEFINITIONS

a) Sound and Noise: "Noise" is usually defined as unwanted sound. If "sound" comprises noises and other sounds, "sound" may be a broader designation. Sound sources within the Onshore Converter Station (OnCS–DC) may be referred as both "noise" and/or "sound". Some animal sounds may be more properly referred to as "sounds" rather than "noise". For the purposes of this protocol the words "sound" or "noise" may be used interchangeably.

b) Background sound: All-encompassing sound associated with a given environment without contributions from the source or sources of interest as specified in this protocol.

c) Continuous background sound: Background sound measured during a measurement period, after excluding the contribution of transient background sounds by inhibiting the collection or post-processing. For the purposes of this protocol the term "background sound(s)" is used for both "background sound(s)" and "continuous background sound(s)", interchangeably.

d) Operational sound: Sound that includes both Onshore Converter Station (OnCS–DC) noise sources and background sound unless otherwise noted.

e) Onshore Converter Station (OnCS–DC) sound only: All sounds originating from the Onshore Converter Station (OnCS–DC) without contributions of background sounds as specified in this protocol.

f) Transient background sound: Background sound associated with one or more sound events which occur infrequently during the basic measurement period, a measurement interval with or without the source operating, as specified in this protocol.

g) Protocol: Refers to this document, the Sound Testing Compliance Protocol, unless otherwise noted.

15) REFERENCES

References listed in this section are for informational purposes only.

a) ANSI S1.4-1983 (R 2006) American National Standard Specification for Sound Level

Meters; and Amendment No. 1 in ANSI S1.4A-1985

b) ANSI/ASA S1.11-2004 (R 2009) American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters
c) ANSI/ASA S1.40-2006 (R 2011) American National Standard Specifications and Verification Procedures for Sound Calibrators
d) ANSI/ASA S1.43-1997 (R 2012) American National Standard Specifications for Integrating-Averaging Sound Level Meters
e) ANSI/ASA S12.9-2013/Part 3 (Quantities and Procedures for Description and Measurement of Environmental Sound. Part 3: Short-Term Measurements with an Observer Present)
f) ANSI/ASA S12.9-2005/Part 4 (Quantities and Procedures for Description and Measurement of Environmental Sound – Part 4: Noise Assessment and Prediction of Long-term Community Response).
g) ANSI/ASA S12.18-1994 (R 2009) American National Standard Procedures for Outdoor Measurement of Sound Pressure Level.
h) ISO 226: 2003, Acoustics – Normal equal-loudness contours.

Table 1: Thresholds of human hearing for evaluation of audibility of tones

1/3 Octave Band Center Frequency [Hz]	Threshold of Hearing [dB] (most sensitive 95 % of population)
20	68.5
25	58.7
31.5	47.3
40	40.4
50	33.9
63	28.6
80	24.0
100	19.9
125	15.9
160	11.7
200	8.1
250	5.1
315	2.4
400	0.3
500	-1.4
630	-3.0
800	-4.2
1,000	-4.7
1,250	-4.2
1,600	-6.5
2,000	-9.7
2,500	-12.5
3,150	-14.0
4,000	-13.4
5,000	-9.8
6,300	-2.8
8,000	3.1
10,000	3.6

The threshold levels are intended to account for the hearing threshold of 95% of the public. Values from 31.5 Hz to 10,000 Hz inclusive are taken from P05 in Table 2 of Kenji Kurakata, Tazu Mizunami and Kazuma Matsushita, Percentiles of normal hearing-threshold distribution under free-field listening conditions in numerical form, Acoustical Science and Technology Journal (published by Acoustical Society of Japan)

Volume 26, Number 5 (2005), pp. 447-449. At 25 Hz the threshold level is 10 dB below the ISO 226:2003 median value and is also believed to account for the hearing threshold of 95% of the public.

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APPENDIX N

BETHNIC SAMPLING PLAN

Sunrise Wind Benthic Monitoring Plan – New York State Waters

June 24, 2022

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Figure A-3. Minimum detectable differences (MDD) as a function of sampling effort (number of stations) for total number of species, Shannon-Weiner Index, and total infaunal abundance. The median and upper 90th percentile of the bootstrapped distribution of CVs, with and without Station S402 were used to estimate the MDD with 90% confidence and 80% power for a study design that utilizes two replicates and between five and twenty stations. Red line represents an estimated ecologically meaningful difference derived from regional infaunal data reported in Byrnes et al. (2004), as detailed in the text. A-5

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1.0 INTRODUCTION

Sunrise Wind LLC (Sunrise Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct, operate, and maintain the Sunrise Wind New York Cable Project (the Project). Sunrise Wind executed a 25-year Offshore Wind Renewable Energy Certificate (OREC) contract related to the Sunrise Wind Farm (SRWF) and the Project with the New York State Energy Research and Development Authority (NYSERDA) in October 2019. The Project will deliver power from the SRWF, located in federal waters on the Outer Continental Shelf (OCS), to the existing electrical grid in New York (NYS) (Figure 1). The Project includes offshore and onshore components within NYS and will interconnect at the existing Holbrook Substation, which is owned and operated by the Long Island Power Authority (LIPA).

Power from the SRWF will be delivered onshore via a submarine export cable (SRWEC), which will be located in both federal and NYS waters. Figure 2 provides an overview of the NYS portion of the cable (SRWEC-NYS). The SRWEC-NYS is comprised of one direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 5.2 miles (mi) (8.4 kilometers [km]) in length in NYS waters and up to 1,339 feet (ft) (408 meters [m]) located onshore (i.e., above the Mean High Water Line [MHWL], as defined by the United States [US] Army Corps of Engineers [USACE] [33 Code of Federal Regulations (CFR 329)]) and underground, up to the transition joint bays (TJBs).

The Landfall for the SRWEC–NYS will occur at Smith Point County Park, and two potential approaches for the associated horizontal directional drill (HDD) are being considered due to the presence of an existing telecommunications cable in proximity to the landfall location. The Onshore Transmission Cable crosses the Long Island Intracoastal Waterway (ICW) (i.e., the inlet between Bellport Bay and Narrow Bay) from Smith Point County Park to Smith Point Marina and will also be installed via HDD (Figure 2). This is referenced in this monitoring plan as the “ICW HDD”.

This benthic monitoring plan (BMP) has been developed in accordance with recommendations set forth in “Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf” (BOEM 2019). This benthic monitoring plan will be revised through an iterative process, and survey protocols and methodologies will be refined and updated based on feedback received from stakeholder groups.

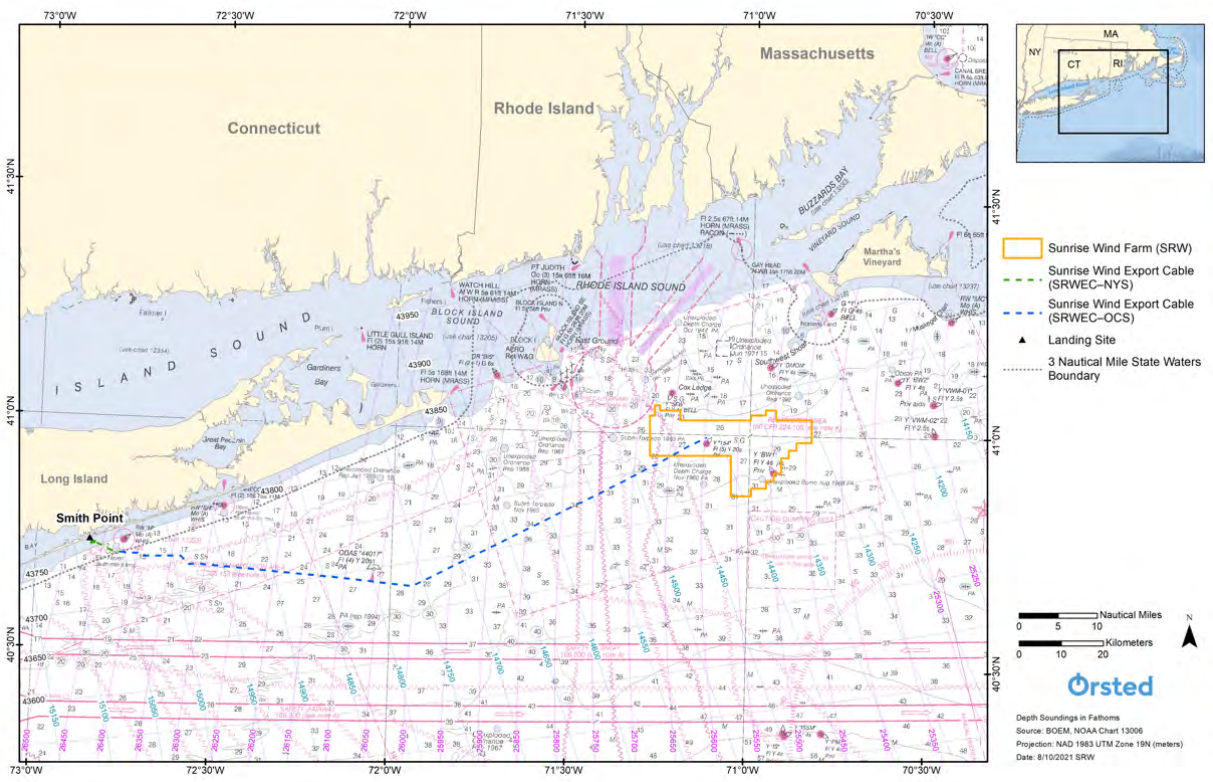


FIGURE 1. Overview of the proposed Sunrise Wind project

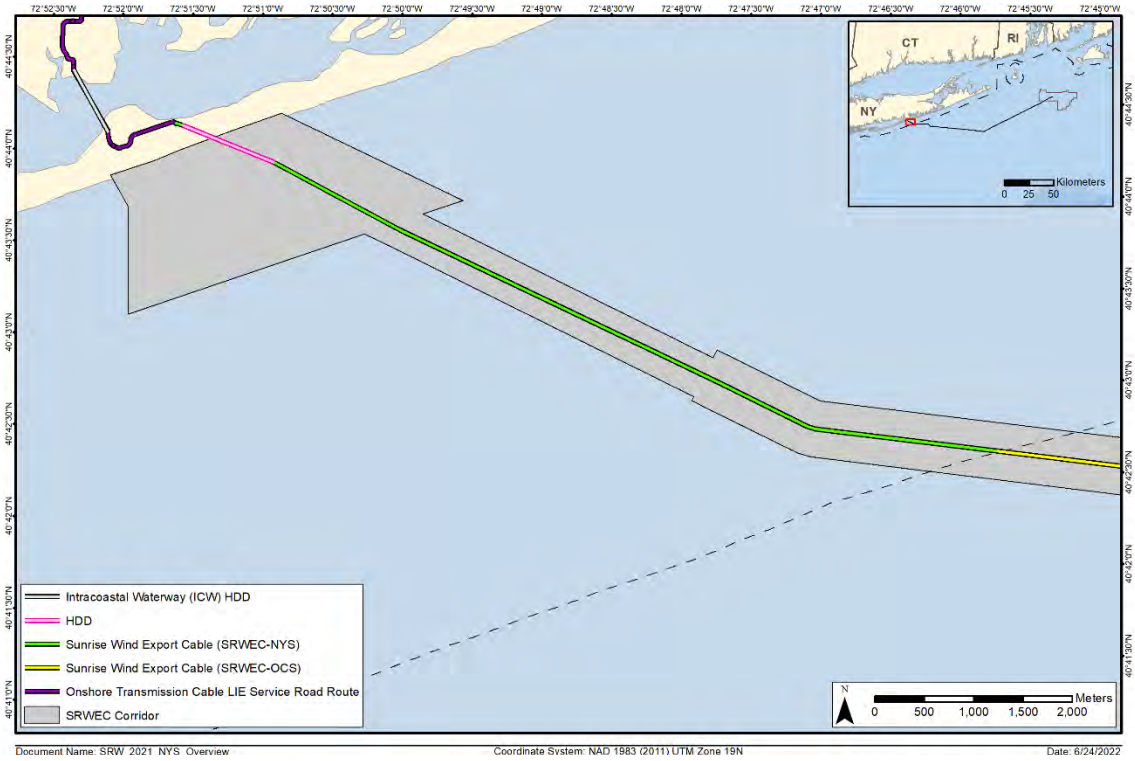


FIGURE 2. Overview of the proposed SRWEC-NYS and ICW HDD routes

2.0 OBJECTIVES

INSPIRE Environmental (INSPIRE) has prepared this draft benthic monitoring plan for characterizing the benthic environment along the proposed SRWEC-NYS corridor. Specifically, the objectives of these surveys are to characterize seafloor conditions, including the collection of geophysical and biological parameters, prior to and after the installation of the SRWEC-NYS. This benthic monitoring plan is designed to summarize baseline benthic conditions that were observed prior to cable installation within New York State waters, and subsequently monitor post-installation benthic conditions to assess any effects resulting from installation activities and operation of the SRWEC-NYS. Sediment profile and plan view imaging (SPI/PV) in combination with sediment grab samples will be used to meet these benthic assessment goals.

3.0 METHODOLOGICAL APPROACHES OVERVIEW

This benthic monitoring plan includes details of the pre-construction and post-construction surveying of soft sediment habitats along the SRWEC-NYS. A combination of SPI/PV imaging and sediment grab sampling will be used to monitor these benthic environments.

SPI/PV is a widely accepted approach to assess the seafloor as it provides an integrated, multi-dimensional view of the benthic and geological condition of the seafloor sediments (Germano ***et al.***, 2011). Specifically, SPI/PV imagery provides insight into benthic functioning such as organic matter remineralization (e.g., the depth of bioturbation, aRPD depth) and small-scale biogenic structures (low-relief tubes, burrows, and emergent fauna). Since this method preserves the organism-sediment relationship, it can accurately characterize benthic epifauna and infauna communities in relation to the local environmental context. Pairing SPI and PV images provides a comprehensive depiction of the seafloor that, through standardized analysis and interpretation (e.g., using the BOEM-recommended Coastal and Marine Ecological Classification Standard (CMECS); FGDC, 2012; BOEM, 2019) allows for accurate comparisons to be made before and after installation activity. SPI/PV provides real-time results that can be assessed onboard during the surveys, which allows for rapid adaptive sampling to target locations of interest.

Taxonomic benthic community analysis of sediment grab samples provides quantitative descriptions of soft sediment communities including community structure (beta diversity), abundances of taxa, and community diversity (species richness, alpha diversity). Populations of soft sediment taxa are often dynamic and patchy in nature. However, the natural spatial and temporal patchiness of these communities generally does not influence the overall benthic health or function (e.g., respiration, food provisioning, biogenic structure) of the benthic ecosystem at any given location or time. Drawing inferences about factors that influence changes in benthic community structure is challenging but perhaps obsolete given consistent benthic functioning (e.g., food provision, organic matter remineralization, benthic-pelagic coupling) across taxonomically distinct benthic communities (e.g., Belley and Snelgrove 2016). The benthic community analysis approach will provide an assessment of potential changes in quantitative community diversity metrics and particular species abundances.

4.0 SRWEC-NYS SOFT BOTTOM MONITORING

Hypotheses:

- Physical disturbance of soft sediments from cable installation will temporarily disrupt function of the infaunal community, community function is expected to return to pre-disturbance conditions (e.g., Kraus and Carter 2018).
- Physical disturbance of soft sediments from cable installation will temporarily decrease the abundances and diversity of the infaunal community in close proximity to the cable, infaunal community metrics are expected to return to pre-disturbance conditions.

a. Completed Pre-Construction Baseline Benthic Assessment

A pre-cable installation survey was previously conducted 12-13 August 2020 (SPI/PV collection) and 18 August 2020 (sediment grab collection), prior to commencement of cable installation activities in the area (INSPIRE, 2021a). Thus, the benthic habitats along the SRWEC-NYS are already documented in sufficient detail, and no additional pre-construction benthic monitoring will be conducted. Details on the methods and results of this pre-construction benthic characterization survey are provided in Appendix M2 of the COP (INSPIRE 2021a) and Appendix 4-G of the Article VII Application (Case 20-T-0617) filed in December 2020. Benthic habitat mapping was completed using the point data collected during this August 2020 survey, as well as analysis and interpretation of the high-resolution geophysical data (multi-beam and side scan sonar data) collected in 2019, 2020, and 2021 (Sunrise Wind LLC 2021); detailed habitat mapping methods and results are provided in Appendix M3 of the COP (INSPIRE 2021b). Provided here is a summary of the findings that are detailed in Appendices M2 and M3 of the COP and Appendix 4-G of the Article VII Application (Case 20-T-0617) filed in December 2020 (INSPIRE 2021a and 2021b).

During initial pre-construction benthic survey planning, a Benthic Survey Protocol document was prepared and submitted to federal and state agencies for review in November 2019. Two meetings were held in December 2019 with representatives from BOEM, the National Oceanic and Atmospheric Association (NOAA), National Parks Service, New York State Department of Environmental Conservation (NYSDEC), New York State Energy Research and Development Authority (NYSERDA), New York Department of State (NYSDOS), Massachusetts Division of Marine Fisheries (MADMF), Massachusetts Office of Coastal Zone Management (MACZM), Rhode Island Department of Environmental Management (RIDEM), and Rhode Island Coastal Resources Management Council (RICRMC) to discuss survey logistics, field techniques and equipment, data acquisition systems, parameters to be measured, data processing, analysis and interpretation, and report format. Comments and discussion points generated from that meeting were incorporated into a revised version of the Benthic Survey Protocol and provided to agencies in January 2020. Additional written comments received in January and February 2020 from NYSDEC, NOAA, MADMF, and NYSDOS were incorporated into the Benthic Survey Protocol and an additional revised version was provided to agencies in April 2020. During a webinar in July 2020, the proposed plans for sampling the SRWEC–NYS (SPI/PV, sediment grabs) were discussed with the above-mentioned stakeholders. Following the survey, which was completed in August 2020, preliminary results were shared with federal and state agencies during a webinar in October 2020. A summary of the survey design and results is provided here.

The initial baseline pre-construction survey consisted of a SPI/PV station every 1,000-ft along the proposed SRWEC-NYS route (Figure 3). A total of 35 SPI/PV stations were sampled along the SRWEC-

NYS; three SPI/PV image replicates were collected and analyzed at each station. Additionally, three replicate sediment grab samples were collected at an interval of one every 2,000-ft along the centerline of the proposed SRWEC-NYS route, totaling 18 grab sample stations and 54 total grab samples. Sediment subsamples were collected from each sediment grab sample for grain size analysis and the remaining sediment was processed (i.e., sieved and preserved) onboard the vessel for benthic community analysis (BCA) by standard Environmental Protection Agency approved protocols (Swartz, 2004). BCA results were summarized with metrics for total abundance, species richness, and Shannon-Wiener diversity index. These data were used in a statistical power analysis for the comparison of these metrics between pre- and post-installation time periods and to inform the planned post-construction monitoring survey design (see Section 4.0 c; Attachment A).

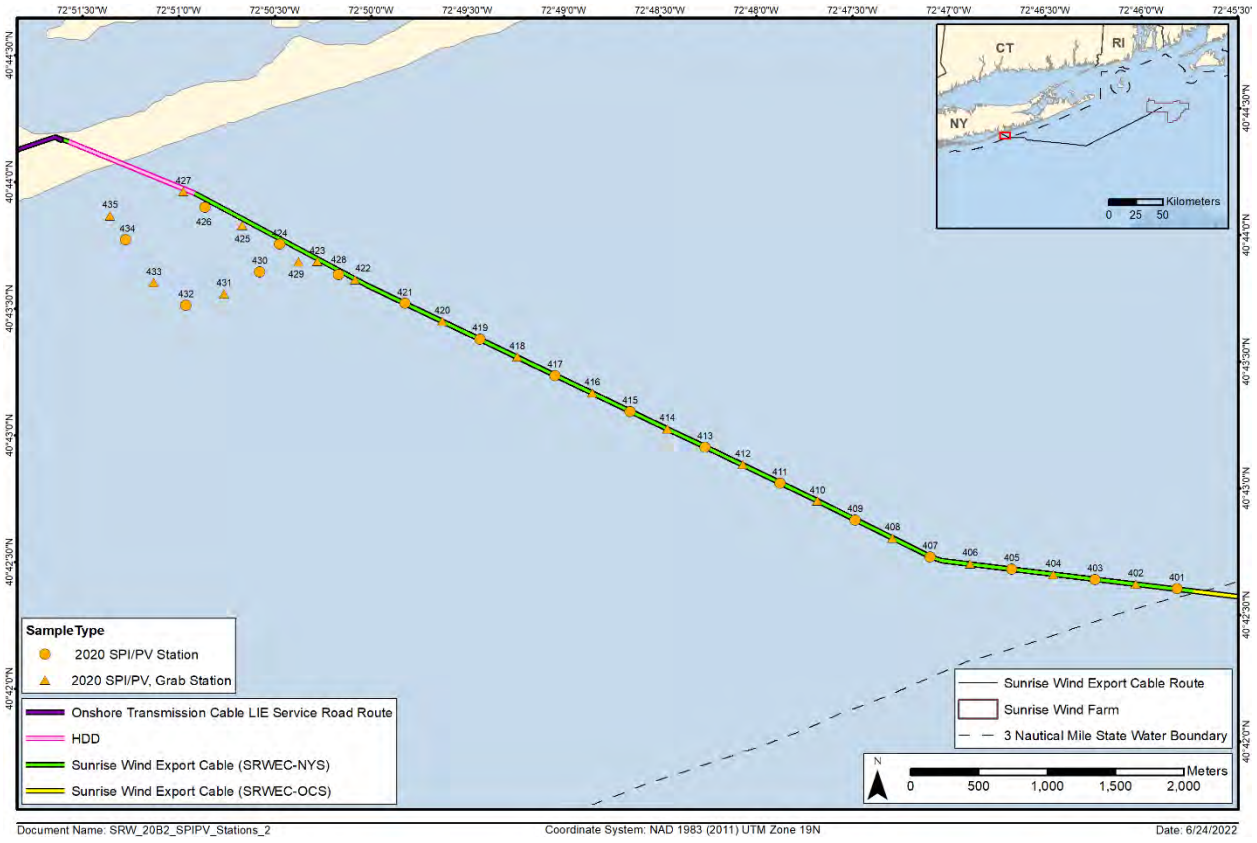


FIGURE 3. Station locations where SPI and PV images and sediment grab samples were collected along the SRWEC–NYS. Map originally from INSPIRE (2021a).

The benthic environment at all the SPI/PV stations along the SRWEC–NYS in August 2020 was characterized as soft sediment habitat. Specifically, four macrohabitat types were observed along the SRWEC–NYS as informed by the sediment composition (CMECS Substrate Subgroup) and inferred small-scale mobility (i.e., bedforms): ***sand with ripples***, ***sand***, ***sand and mud,*** or ***sand and mud with ripples*** (Figure 4). These four macrohabitats are similar in characteristics; specifically, all four consist of sandy sediments ranging from Very Fine Sand to Medium Sand (CMECS Substrate Subgroup) with no gravel. The sediment grab samples collected along the SRWEC–NYS were overwhelmingly dominated by sand (>90%) with minor silt/clay and gravel. Benthic community analysis of the sediment grab samples showed

three taxa made up the majority of individuals observed across all replicates along the SRWEC–NYS: (1) the polychaete, ***Polygordiidae*** (Family) ***Polygordius*** (Genus, LPIL), (2) the polychaete ***Capitellidae (***Family) ***Mediomastus*** (Genus, LPIL), and (3) the amphipod ***Haustoriidae*** (Family) ***Protohaustorius wigleyi.*** No sensitive taxa, species of concern, or non-native species were observed at any of the SPI/PV stations along the SRWEC–NYS during the August 2020 survey.

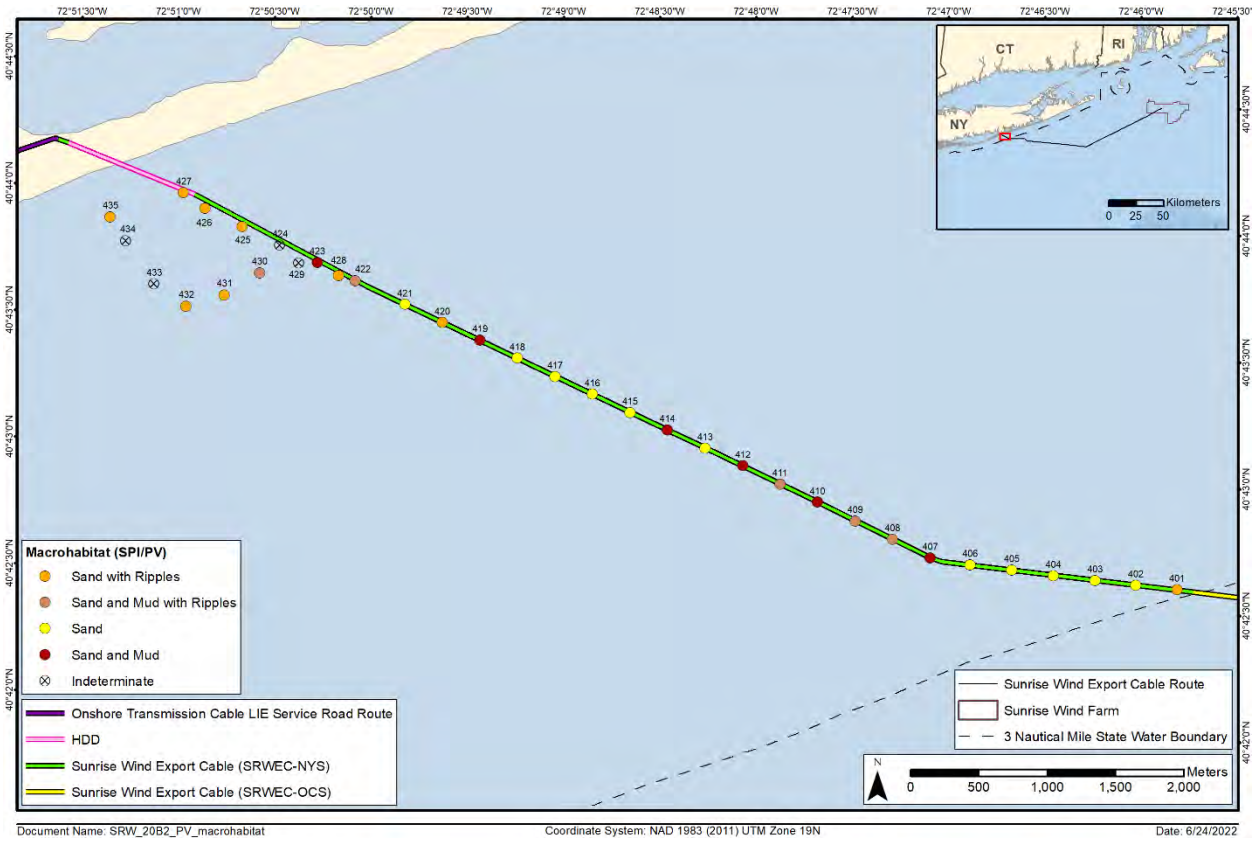


FIGURE 4. Macrohabitat type classifications along the proposed SRWEC-NYS route as characterized by SPI/PV imagery. Map originally from INSPIRE (2021a).

Using the results of the SPI/PV and sediment grab sample survey and analysis and interpretations high-resolution geophysical data collected along the corridor (Sunrise Wind LLC 2021), the benthic habitats along the SRWEC-NYS were characterized and mapped (INSPIRE 2021b). Detailed methods and results of habitat mapping are described in the Habitat Mapping Report, which is Appendix M3 of the COP (INSPIRE 2021b). The majority of the benthic environment surrounding the SRWEC-NYS and along the planned SRWEC-NYS route was sand and muddy sand (Figure 5). Areas of coarse sediment occurred near shore in discrete striated patches oriented approximately perpendicular to shore. The benthic environment was more mobile closer to shore.

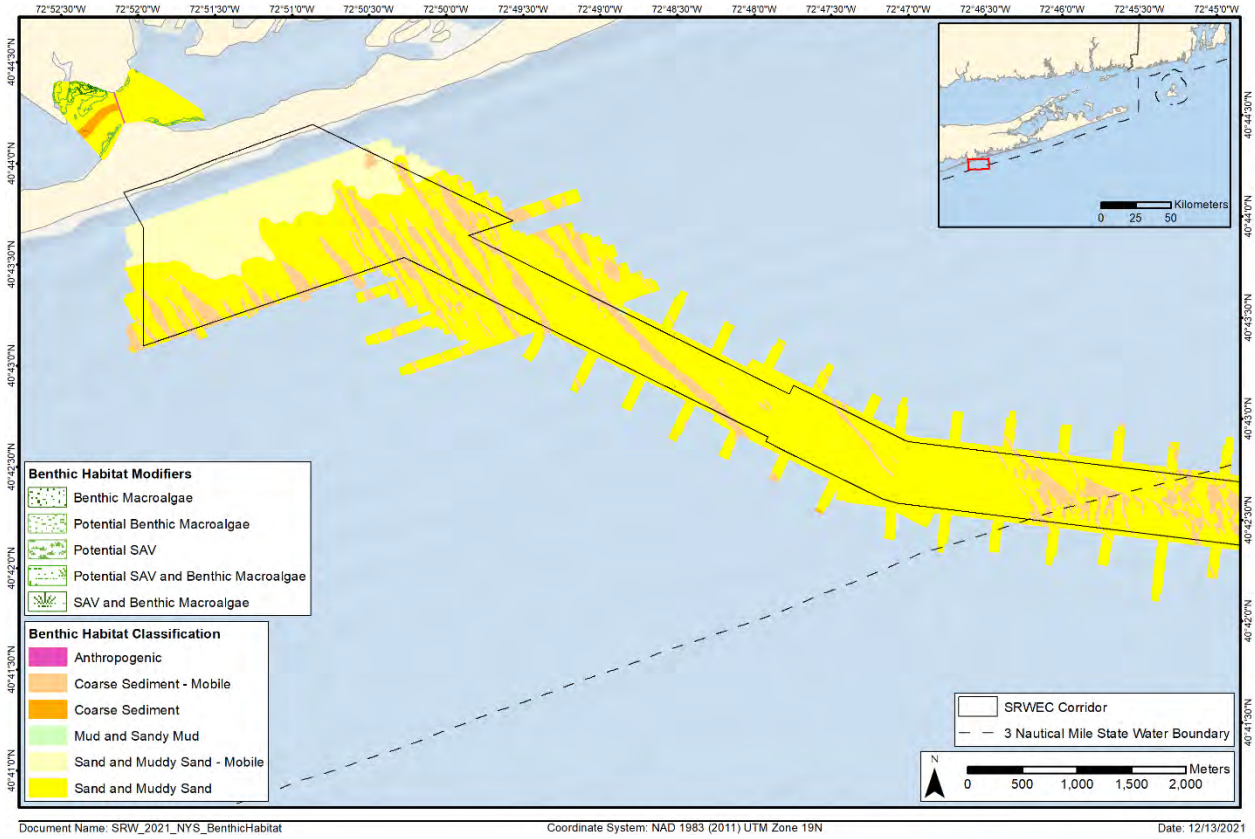


FIGURE 5. Benthic habitat classifications interpretated from high resolution multi-beam acoustic data and SPI/PV data as detailed in INSPIRE (2021b). Map modified from INSPIRE (2021b).

b. Post-Construction Benthic Monitoring

At least two field sampling events will occur after the proposed SRWEC-NYS has been installed. Post-construction monitoring surveys will occur between August 1st and October 31st each year within 24 months of the Sunrise Wind Farm Project's commercial operational date. During the post-cable installation surveys, three stations will be sampled with SPI/PV in a transect perpendicular to the SRWEC-NYS, with one station as close as practicable to the centerline and one station approximately 100-ft on either side (Figure 6). These transects will repeat at 1,000-ft intervals from the HDD exits offshore to the territorial limit of NYS waters. At each SPI/PV station a minimum of three replicate images shall be collected and analyzed. At each SPI/PV station, a Conductivity, Temperature, Depth sensor will be used to measure the salinity and temperature through the water column to the sediment surface. Additionally, the temperature of the sediments will be measured at each SPI/PV station. The SPI/PV sampling will be supplemented with sediment grab stations located at transects every 2,000-ft along the SRWEC-NYS centerline, with one grab sample station as close as practicable to the centerline and one grab sample station approximately 100-ft on the eastern side of the cable. At each grab station three replicate grab samples will be collected, sieved onboard, and preserved. One replicate grab sample from each grab station will be analyzed for BCA by standard Environmental Protection Agency approved protocols (Swartz, 2004); the other two replicate grab samples will be archived and analyzed if greater precision is needed to determine if an ecological meaningful difference exists between pre-construction and post-construction communities (see below).

Benthic community data will be statistically compared across years and distance from the cable, with a specific focus on total infaunal abundances, Shannon-Weiner Index, and total number of species as response variables. SPI/PV imagery-derived metrics will be statistically compared across years and distance from the cable. The water column profile data will be used as potential explanatory variables to inform the post-construction comparison between the benthic habitat and community at stations along the centerline of the cable versus those located 100-ft from the cable centerline. Sediment temperature measurements collected during the post-construction monitoring surveys at stations along the centerline of the cable will be compared to those measurements collected 100-ft from the cable centerline, using distance from shore and depth as potential covariates.

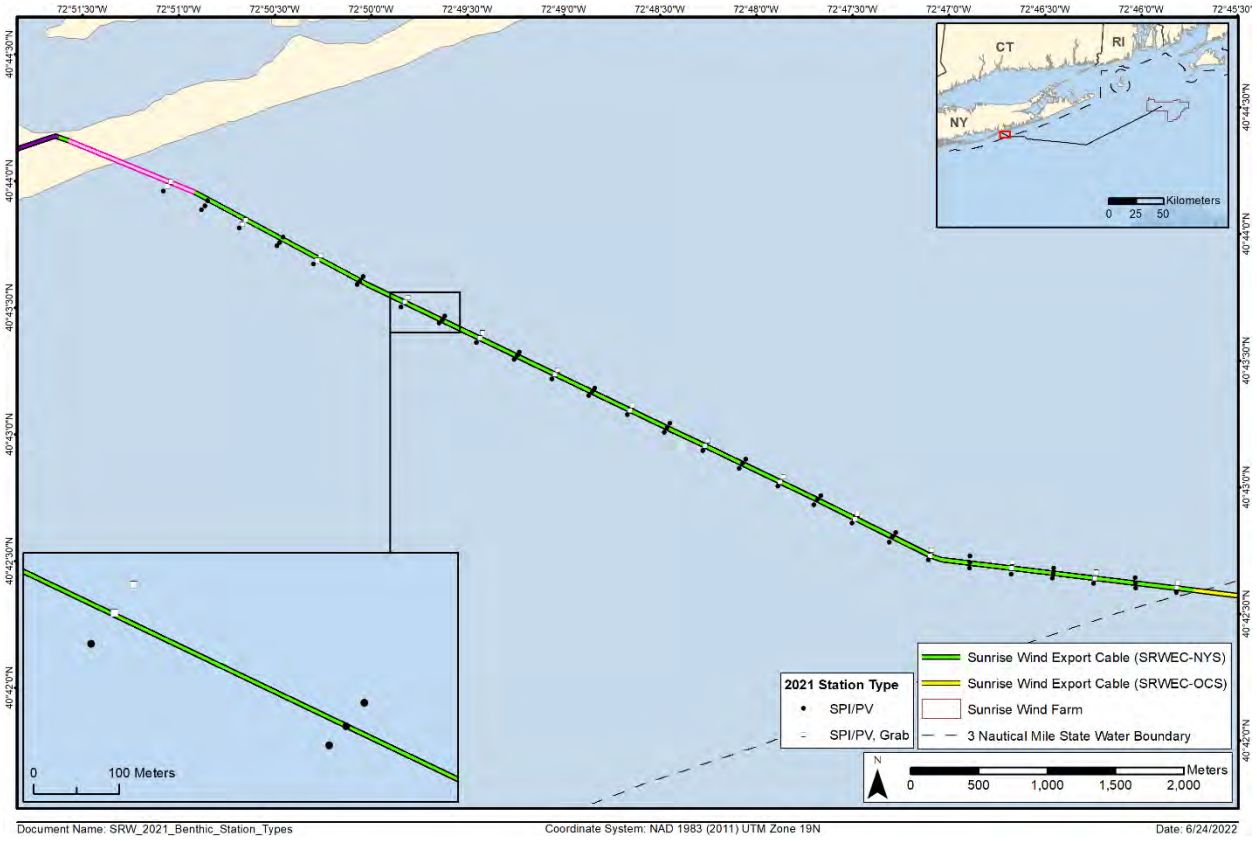


FIGURE 6. Targeted SPI/PV and sediment grab sample locations within NY state waters along the proposed SRWEC-NYS for the post-installation survey. This is a conceptual representation of the planned station locations for one of the landfall HDD route options.

Results of the post-cable installation SPI/PV benthic sampling events (including the collected water column CTD data and sediment temperature data) shall be submitted to the New York State Department Public Service, New York State Department of State, New York State Department of Agriculture and Markets, and the New York State Department of Environmental Conservation in a final written report within 6 months of the completion of each sampling event. The results of the BCA will be provided as a supplement of the report within 9 months of the completion of each sampling event. All data collected under this plan will be made publicly available in shapefile and PDF format. An addendum to this benthic assessment report that integrates the results of an independent electric and magnetic field (EMF) study with the results of these benthic surveys, including a discussion of potential EMF impacts to the benthic

habitat, will be included when the EMF data collection, processing, and interpretation are finalized and become available.

c. Estimating Minimum Detectable Difference

For the power analysis, the 2020 baseline data were bootstrapped by selecting two replicates (without replacement) for each station, this was repeated 1,000 times and the Coefficient of Variation (CV) across the 18 station means was calculated from each bootstrap replicate. This analysis revealed that for a sample design with 18 stations (2 replicate sediment grabs per station), the minimum detectable differences (MDD) for total infaunal abundances, Shannon-Weiner Index, and total number of species, were 69%, 29%, and 31% of the means (using the upper 90th percentile CV as a conservative estimate), respectively (details in Attachment A).

This power analysis was repeated but with one replicate sediment grab per station. This analysis revealed that for a sample design with 18 stations (one replicate sediment grab per station), the MDD for total infaunal abundances, Shannon-Weiner Index, and total number of species, were 90%, 32%, and 36% of the means (using the upper 90th percentile CV as a conservative estimate), respectively (details in Attachment A).

These MDD (both the one and two replicate scenarios) were then compared to an estimated ecologically meaningful difference for this region and 'biotope' or habitat. To identify what constitutes an ecologically meaningful difference for this habitat, available regional data were evaluated to quantify natural spatial/temporal variability in the area. Infauna data reported in Byrnes et al. (2004) were used as regional data (details in Attachment A). However, since this dataset was limited in spatial and temporal replication and scale, the derived ecologically meaningful differences should be considered rough estimates; any additional regional data provided or obtained in the future should be used to refine these estimates. This analysis revealed that ecologically meaningful difference estimates in this region for total infaunal abundances, Shannon-Weiner Index, and total number of species were 68%, 49%, and 57% of the means, respectively (red dashed lines in Figure 4). This suggests that a post-construction study design of 18 stations, each with 2 replicate sediment grab samples (0.04 m^2), will be able to detect an ecologically meaningful difference in total infaunal abundances, Shannon-Weiner Index, and total number of species.

5.0 REFERENCES CITED

Belley, R. and P.V.R Snelgrove. 2016. Relative contributions of biodiversity and environment to benthic ecosystem functioning.

Bureau of Ocean Energy Management (BOEM) Office of Renewable Energy Programs. 2019. Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 CFR Part 585. June 2019.

Byrnes, M.R., R.M. Hammer, S.W. Kelley, J.L. Baker, D.B. Snyder, T.D. Thibaut, S.A Zichichi, L.M. Lagera, S.T. Viada, B.A. Vittor, J.S. Ramsey, and J.D. Germano. 2004. Environmental Surveys of Potential Borrow Areas Offshore Northern New Jersey and Southern New York and the Environmental Implications of Sand Removal for Coastal and Beach Restoration. U.S. Department of the Interior, Minerals Management Service, Leasing Division, Marine Minerals Branch, Herndon, VA. OCS Report MMS 2004-044, Volume I: Main Text 264 pp. + Volume II: Appendices 194 pp.

Colarusso, P. and Verkade, A. 2016. Joint Federal Agency Submerged Aquatic Vegetation Survey Guidance for the New England Region. August 11, 2016.

Federal Geographic Data Committee (FGDC). 2012. Coastal and Marine Ecological Classification Standard. FGDC-STD-018-2012. Marine and Coastal Spatial Data Subcommittee. June 2012. 343 pp. Reston, VA.

Germano, J.D., D.C. Rhoads, R.M. Valente, D. Carey, and M. Solan. 2011. The use of Sediment Profile Imaging (SPI) for environmental impact assessments and monitoring studies: Lessons learned from the past four decades. Oceanography and Marine Biology: An Annual Review 49: 247-310.

INSPIRE Environmental. 2021a. Benthic Resources Characterization Report – New York State Waters Sunrise Wind Farm Project. Appendix M2 of the Construction and Operations Plan. Prepared for Stantec and Sunrise Wind. Submitted to the Bureau of Ocean Energy Management, Sterling, VA. Submitted by Sunrise Wind LLC, New York, NY. October 2021.

INSPIRE Environmental. 2021b. Benthic Habitat Mapping to Support Essential Fish Habitat Consultation Sunrise Wind Farm Project. Appendix M3 of the Construction and Operations Plan. Prepared for Stantec and Sunrise Wind. Submitted to the Bureau of Ocean Energy Management, Sterling, VA. Submitted by Sunrise Wind LLC, New York, NY. October 2021.

Kraus, C. and L. Carter. 2018. Seabed recovery following protective burial of subsea cables – Observations from the continental margin. Ocean Engineering 157: 251-261.

Oksanen, J.F. Guillaume Blanchet, Michael Friendly, Roeland Kindt, Pierre Legendre, Dan McGlinn, Peter R. Minchin, R. B. O'Hara, Gavin L. Simpson, Peter Solymos, M. Henry H. Stevens, Eduard Szoecs and Helene Wagner. 2020. vegan: Community Ecology Package. R package version 2.5-7. https://CRAN.R-project.org/package=vegan

Maher, N.P. and R.M. Cerrato. 2006. Using Species Richness to Estimate Sampling Effort, a report prepared for the Hudson River Estuary program, NYSDEC.

Sunrise Wind LLC. 2021. Sunrise Wind Offshore Farm (SRW01) - Marine Site Investigation Report. Submitted to the Bureau of Ocean Energy Management (BOEM). October 2021.

Swartz, R. 2004. Techniques for Sampling and Analyzing the Marine Macrobenthos. U.S. Environmental Protection Agency, Washington, D.C., EPA/600/3-78/030. https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NHEERL&dirEntryID=4223 9

Attachment A - Power Analysis Using Pre-cable Installation Baseline Benthic Sampling Survey (Completed in 2020)

A pre-cable installation survey occurred in August 2020, prior to commencement of cable installation activities in the area (Figure A-1) (INSPIRE 2021). This initial baseline survey consisted of an SPI/PV station every 1,000 feet along the proposed SRWEC-NYS route. At each SPI/PV station, three SPI/PV image replicates were collected and analyzed. Additionally, three replicate sediment grab samples were collected at an interval of one every 2,000 feet along the centerline of the proposed SRWEC-NYS route. Sediment subsamples were collected from each sediment grab sample for grain size analysis and the remaining sediment was processed (***i.e.*** sieved and preserved) onboard the vessel for benthic community analysis (BCA) by standard Environmental Protection Agency approved protocols (Swartz, 2004). BCA results were summarized with metrics for total abundance, species richness, and Shannon-Wiener diversity index. The variance estimated from these data were used in a statistical power analysis for the comparison of these metrics between pre- and post-installation time periods.

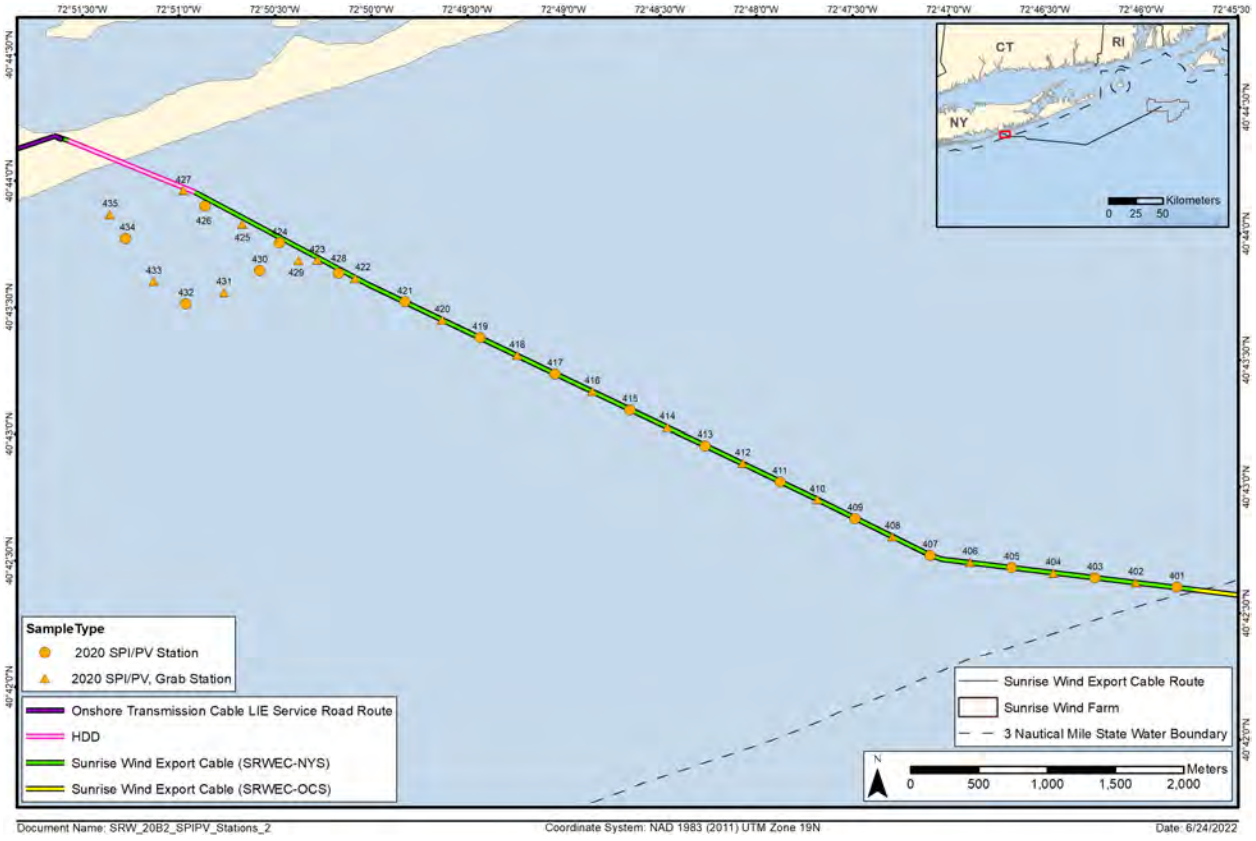


Figure A-1. Sampled SPI/PV and grab sample locations within NY state waters along the proposed SRWEC-NYS for the pre-cable installation baseline survey conducted in August 2020.

Estimating the Minimum Detectable Differences with Sampling Effort

The 2020 BCA data were used to estimate the minimum detectable differences (MDD) with sampling effort (i.e., number of stations). MDD were then compared to an estimate of an ecologically meaningful difference, as discussed below. The power analysis was conducted twice, once assuming one replicate grab sample analyzed per station and a second time assuming two replicate grab samples analyzed per station, to determine the influence of replication on precision and MDD. For the power analysis, the 2020 baseline data were bootstrapped by selecting either one or two replicates (without replacement) for each station, 1000 times; the CV across the 18 station means was calculated from each bootstrap replicate. This was completed with and without Station S402. Station S402 had one replicate with very high abundances of a Polygordius (LPIL) (885 individuals per 0.04 m^2), relative to the other two replicates at this station (355 and 220 individuals per 0.04 m^2) as well as compared with the other 17 stations (ranged from 0 to 276 individuals per 0.04 m^2), which caused substantial skew in the dataset and inflated CVs (Table A-1).

Table A-1. Summary of CVs for abundance, observed number of taxa, and Shannon-Weiner Index, including observed and bootstrapped datasets for n=18 stations and n=17 stations (excluding S402)

	Excludes Station S402 (n=17)			All stations (n=18)		
Percentile	**Abundance**	**Number of Taxa**	**Shannon**	**Abundance**	**Number of Taxa**	**Shannon**
From distribution of 1,000 station means, each based on **one replicate per station** (bootstrapped without replacement)						
90th	0.76	0.43	0.33	1.06	0.42	0.38
50th (median)	0.68	0.38	0.28	0.72	0.38	0.34
From distribution of 1,000 station means, each based on **two replicates per station** (bootstrapped without replacement)						
90th	0.65	0.37	0.28	0.81	0.37	0.34
50th (median)	0.61	0.34	0.26	0.75	0.34	0.32
Observed CV, from the **three replicates per station**						
Observed	0.58	0.33	0.25	0.68	0.32	0.31

The median and upper 90th percentile of the bootstrapped distribution of CVs, with and without Station S402 (Table A-1), were used to estimate the MDD with 90% confidence and 80% power for a study design that utilizes either one or two replicates and between two and twenty stations (Figure A-2). This analysis revealed that for a sample design with 18 stations (1 replicate sediment grabs per station), the minimum detectable differences based on a two-sample t-test for total infaunal abundances, Shannon-Weiner Index, and total number of species, were 90% (64% excluding Station S402), 32% (28% excluding Station S402), and 36% (36% excluding Station S402) of the means (using the upper 90th percentile CV as a conservative estimate), respectively. For a sample design with 18 stations (2 replicate sediment grabs per station), the minimum detectable differences for total infaunal abundances, Shannon-

Weiner Index, and total number of species, were 69%, 29%, and 31% of the means (using the upper 90th percentile CV as a conservative estimate), respectively. These MDD estimates are based on a two-sample t-test, with residual variability determined from the two groups. However, the analysis comparing baseline to post-construction will have three groups (baseline, post-construction centerline, and post-construction 100-ft off-set) each with 18 stations to estimate the residual variability. Using residual variability from three groups will make the tests more powerful than the results presented here, exactly how that will look cannot be determine a priori, so these results are presented as conservative estimates of the predicted power.

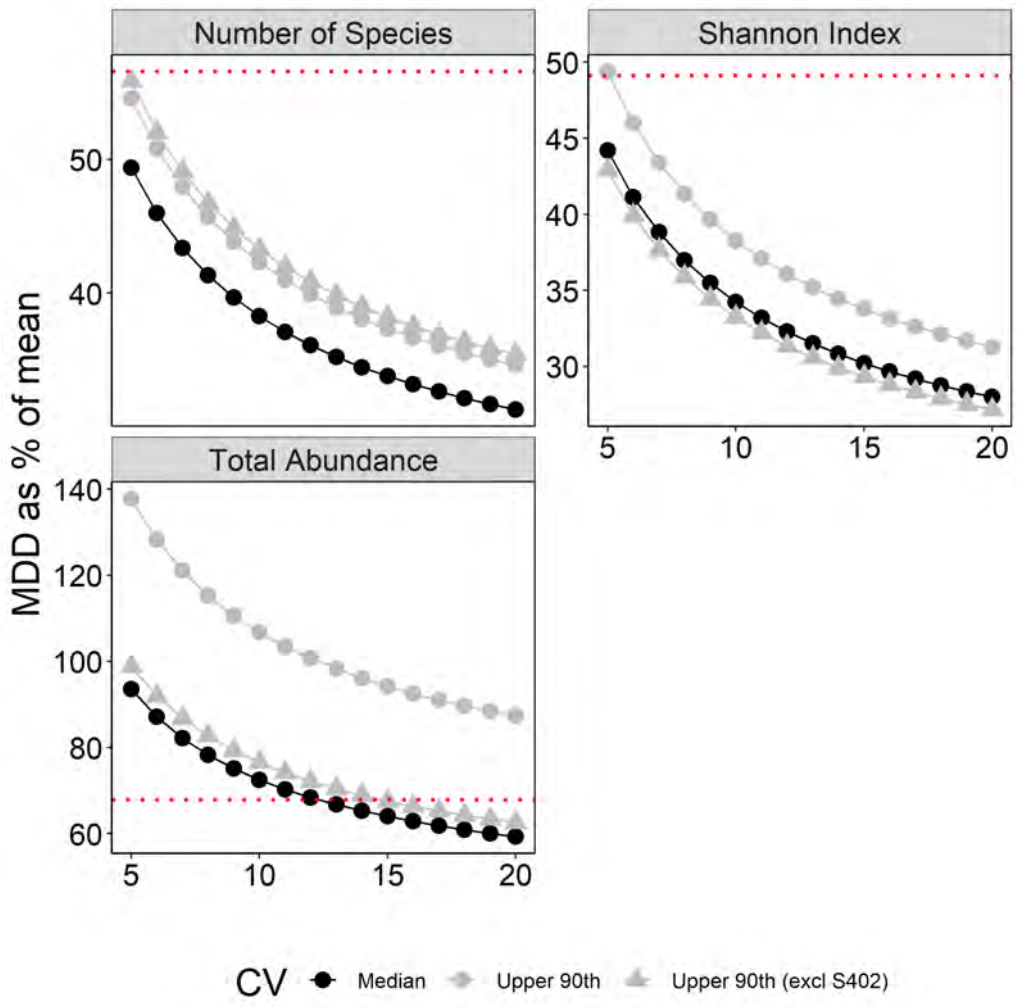
These MDDs for a survey with 18 stations was then compared to an estimated ecologically meaningful difference, derived from a spatially and temporally limited regional dataset, to determine the number of stations required for analysis in the post-installation surveys (red dashed lines, Figure A-2).

To identify what constitutes an ecologically meaningful difference for this habitat, available regional data were mined to quantify natural spatial/temporal variability in the area. Infauna data reported in Byrnes et al. (2004) were used as regional data. This study sampled infaunal communities across six broad areas, all deemed as potential sand borrow sites, with all sample collection occurring prior to any impact from sand excavation activity. The six areas were located off the northern coast of New Jersey and the southwestern coast of Long Island, New York. These sampling areas were in the same general region, depth range (<20 m), and sediment type (fine to coarse sand) as the proposed SRWEC-NYS route. Each of these six areas were sampled twice, September 2001 and June 2002, capturing some degree of natural temporal variability. Sample sizes within the six areas ranged from three to ten each year. The temporal change was calculated for each of the dependent variables of interest (abundance, total number of species, and Shannon-Wiener index) as a relative percent difference (RPD) by area:

$$= \quad (\ _{2001} - \ _{2002}) / -$$

where X_{2001} is the station mean from 2001, X_{2002} is the station mean from 2002, and " the mean of the two years. The threshold statistic chosen as the estimate for an ecologically meaningful difference was the 90% upper confidence limit on the 90th percentile (90/90 Upper Tolerance Limit [UTL]). It is assumed that any difference that statistically exceeds this threshold does not fit with the distribution of these pairwise comparison deltas (n = 6) derived from Byrnes et al. (2004). This analysis estimated ecologically meaningful differences in this region for total infaunal abundances, Shannon-Weiner Index, and total number of species were 68%, 49%, and 57% of the means, respectively (red dashed lines in Figure 4). This suggests that the study design (18 stations, 2 replicates per station) will likely be able to detect an ecologically meaningful difference in total infaunal abundances, Shannon-Weiner Index, and total number of species.

Results of this statistical power analysis and estimation of ecologically meaningful difference will be presented to NYSDEC for review prior to the post- cable installation sampling surveys. If additional regional datasets characterizing infaunal abundances become available, these will be used to refine the ecologically meaningful difference estimation.



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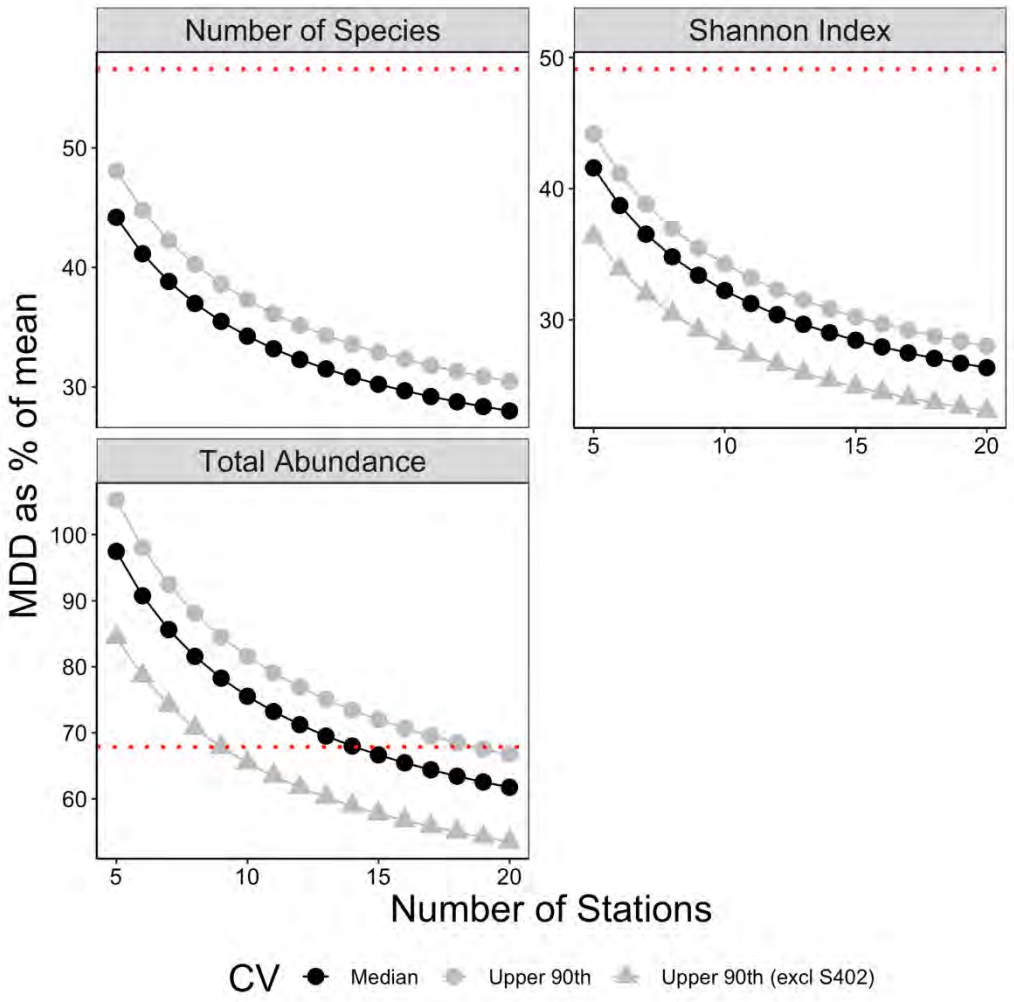

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APPENDIX O

FISHERIES MONITORING PLAN

Sunrise Wind Farm Project

Appendix AA1
Fisheries and Benthic Monitoring Plan

Prepared for:

Sunrise Wind | Powered by Ørsted & Eversource

April 8, 2022

Sunrise Wind | Powered by Ørsted & Eversource

Sunrise Wind Fisheries and Benthic Research Monitoring Plan

April 5, 2022

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Acronyms and Abbreviations

ACCOL	Anderson Cabot Center for Ocean Life
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACT	Atlantic Cooperative Telemetry
AG	Acoustic Gates
AIC	Akaike Information Criteria
ANOSIM	Analysis of Similarities
ANOVA	Analysis of Variance
aRPD	Apparent redox potential discontinuity
ASMFC	Atlantic States Marine Fisheries Commission
BACI	Before-After-Control-Impact
BAG	Before-After-Gradient
BIWF	Block Island Wind Farm
BOEM	Bureau of Ocean Energy Management
CFR	Code of Federal Regulations
CI	Confidence Interval
cm	centimeter
CMECS	Coastal and Marine Ecological Classification Standard
CPUE	Catch per Unit Effort
CTD	Conductivity Temperature Depth
DC	Direct current
DSLR	Digital single-lens reflex
DVR	Digital video recorder
ECDF	Empirical cumulative distribution function
ECO-PAM	Ecosystem and Passive Acoustic Monitoring
EFH	Essential fish habitat
EFP	Exempted Fishing Permit
EMF	Electromagnetic Fields
Eversource	Eversource Investment
FGDC	Federal Geographic Data Committee
FI	Fullness index
FMP	Fisheries Monitoring Plan
ft	feet
FW	Food weight
GAM	Generalized Additive Model
GLM	Generalized Linear Model

GPS	Global Positioning System
HD	High definition
HMS	Highly Migratory Species
HPE	Horizontal position error
IAC	Inter-Array Cable
ITIS	Integrated Taxonomy Information System
kg	kilogram
km	kilometer
LED	Light-emitting diode
LCMA2	Lobster Conservation Management Area 2
LOA	Letter of Acknowledgement
LPIL	Lowest possible identification level
m	meter
MADMF	Massachusetts Division of Marine Fisheries
MA/RI WEA	Massachusetts/Rhode Island Wind Energy Area
MassCEC	Massachusetts Clean Energy Center
MATOS	Mid-Atlantic Acoustic Telemetry Observation System
mm	millimeter
mi	mile
NEAMAP	Northeast Area Assessment and Monitoring Program
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
nMDS	Non-metric Multidimensional Scaling
NMFS	National Marine Fisheries Service
NMFS-PRD	National Marine Fisheries Service Protected Resources Division
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries/NMFS	NOAA National Marine Fisheries Service (formerly NMFS)
NTAP	Northeast Trawl Advisory Panel
NTS	Nearshore Trawl Survey
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
Ocean SAMP	Ocean Special Area Management Plan
OCS	Outer Continental Shelf
OCS–DC	Offshore Converter Station
OnCS–DC	Onshore Converter Station
OSW	Offshore wind

PERMANOVA	Permutational Analysis of Variance
PV	Plan View
QA/QC	Quality Assurance/Quality Control
RI CRMC	Rhode Island Coastal Resources Management Council
RIDEM	Rhode Island Department of Environmental Management
ROM	Rate of movement
ROSA	Responsible Offshore Science Alliance
ROV	Remotely Operated Vehicle
R/V	Research Vessel
RWF	Revolution Wind Farm
SFEC	South Fork Export Cable
SFW	South Fork Wind
SIMPER	Similarity Percentages
SNECVTS	Southern New England Cooperative Ventless Trap Survey
SOD	Sediment oxygen demand
SPI	Sediment Profile Imaging
SRWEC	Sunrise Wind Export Cable
SRWEC-NYS	Sunrise Wind Export Cable – New York State Waters
SRWEC-OCS	Sunrise Wind Export Cable – Outer Continental Shelf
SRWF	Sunrise Wind Farm
SS	Systematic (random) sampling
Sunrise	Wind Sunrise Wind LLC
TJB	Transition joint bay
UHD	Ultra-High Definition
USBL	Ultra Short Baseline
VMS	Vessel Monitoring System
VTR	Vessel Trip Report
WEA	Wind Energy Area
WTG	Wind Turbine Generator

1.0 INTRODUCTION

Sunrise Wind LLC (Sunrise Wind), a 50/50 joint venture between Orsted North America Inc. (Orsted NA) and Eversource Investment LLC (Eversource), proposes to construct and operate the Sunrise Wind Farm (SRWF) and the Sunrise Wind Export Cable (SRWEC), collectively the Sunrise Wind Farm Project (hereinafter referred to as the Project). The wind farm portion of the Project will be located in federal waters on the Outer Continental Shelf (OCS) in the designated Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0487 (Lease Area).[1] The Lease Area is approximately 30.5 statute miles (mi) east off the coast of Montauk, New York (Figure 1). The Lease Area was awarded through the BOEM competitive renewable energy lease auction of the Wind Energy Area off the shores of Massachusetts and Rhode Island Wind Energy Area (MA/RI WEA). Other components of the Project will be located in New York State (NYS) waters and onshore in the Town of Brookhaven, Long Island, New York. The Project will specifically include the following offshore and onshore components:

Offshore:

- up to 94 Wind Turbine Generators (WTGs) at 102 potential locations;
- one Offshore Converter Station (OCS–DC);
- up to 180 mi (290 km) of Inter-Array Cables (IAC); and
- one direct current (DC) submarine export cable, referred to as the SRWEC, within an up to 105-mi (169-km) long corridor.

Onshore:

- a landfall location located at Smith Point County Park, Town of Brookhaven, New York;
- an Onshore Transmission Cable, transition joint bays (TJBs) and associated components;
- an Onshore Interconnection Cable;
- a fiber optic cable co-located with the Onshore Transmission and Onshore Interconnection Cables; and
- a new Onshore Converter Station (OnCS–DC) located in proximity to the existing Holbrook Substation.

The Project's components are grouped into four general categories: the SRWF, inclusive of the WTGs, OCS–DC, and IACs; the SRWEC–OCS, inclusive of up to 100 mi (161 km) of the SRWEC in federal waters; the SRWEC–NYS, inclusive of up to 5.2 mi (8.4 km) of the SRWEC in state waters; and Onshore Facilities, inclusive of an up to 17.5 mi (28.2 km) Onshore Transmission Cable, a new Onshore Converter Station (OnCS–DC), and Onshore Interconnection Cable. Figure 1 depicts the Project overview and indicates the area within which offshore Project infrastructure will be sited; seafloor impacts (including from

[1]A portion of Lease Area OCS-A 0500 (Bay State Wind LLC) and the entirety of Lease Area OCS-A 0487 (formerly Deepwater Wind New England LLC) were assigned to Sunrise Wind LLC on September 3, 2020, and the two areas were merged and a revised Lease OCS-A 0487 was issued on March 15, 2021. Thus, when using the term "Lease Area" within this document, Sunrise Wind is referring to the new merged Lease Area OCS-A 0487.

vessel anchoring) will not extend beyond these areas. The Project is scheduled to begin construction in Q3 2023, with installation of the onshore components, and to be commissioned and operational by Q4 2025.

This Fisheries and Benthic Research Monitoring Plan (FMP) has been developed in accordance with recommendations set forth in “Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf” (BOEM 2019), which state that a fishery survey plan should aim to:

- Identify and confirm which dominant benthic, demersal, and pelagic species are using the project site, and when these species may be present where development is proposed;
- Establish a pre-construction baseline which may be used to assess whether detectable changes associated with proposed operations occurred in post-construction abundance and distribution of fisheries;
- Collect additional information aimed at reducing uncertainty associated with baseline estimates and/or to inform the interpretation of research results; and
- Develop an approach to quantify any substantial changes in the distribution and abundance of fisheries associated with proposed operations.

Further, BOEM provides guidance related to specific survey gears that can be used to complete the fisheries monitoring including otter trawl, beam trawl, gillnet/trammel net, and ventless traps. BOEM guidelines stipulate that two years of pre-construction monitoring data are recommended, and that data should be collected across all four seasons. Consultations with BOEM and other agencies are encouraged during the development of fisheries monitoring plans. BOEM also encourages developers to review existing data, and to seek input from the local fishing industry to select survey equipment and sampling protocols that are appropriate for the area of interest. Benthic monitoring that is planned for New York state waters is described in a separate monitoring plan.

Introduction

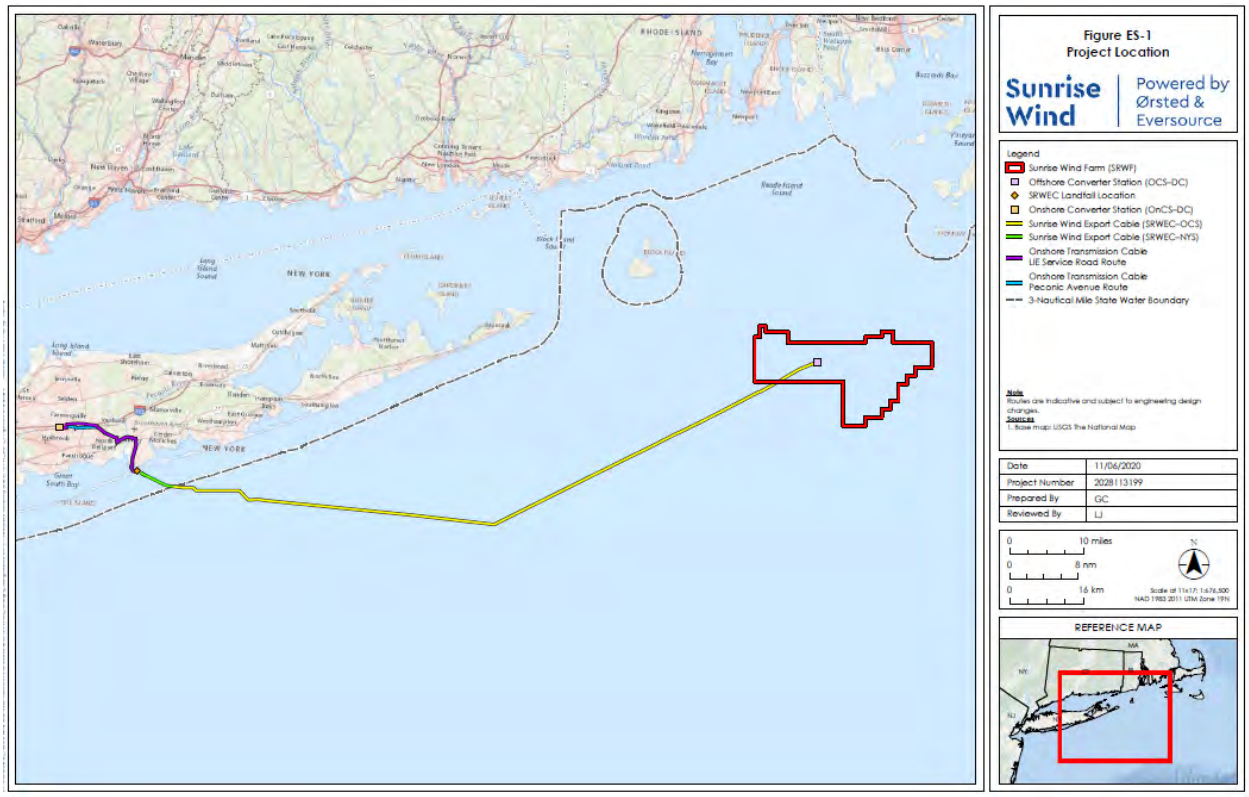

Figure 1. Map of the Project Area, including the Export Cable route.

The Rhode Island Coastal Resources Management Council (RI CRMC) also set out monitoring guidelines as part of the Rhode Island Ocean Special Area Management Plan (Ocean SAMP; RICRMC 2010) which stipulate that RI CRMC shall work in conjunction with the Joint Agency Working Group to "determine requirements for monitoring prior to, during, and post construction. Specific monitoring requirements shall be determined on a project-by-project basis and may include but are not limited to the monitoring of coastal processes and physical oceanography, underwater noise, benthic ecology, avian species, marine mammals, sea turtles, fish and fish habitat, commercial and recreational fishing, recreation and tourism, marine transportation, navigation and existing infrastructure, and cultural and historic resources." Further guidance from the RI CRMC (McCann et al. 2013) dictates that "[t]his assessment shall examine the relative abundance, distribution, and different life stages of these species at all four seasons of the year. This assessment shall comprise a series of surveys, employing survey equipment and methods that are appropriate for sampling finfish, shellfish, and crustacean species at the Project's proposed location. Such an assessment shall be performed at least four times: pre-construction (to assess baseline conditions); during construction; and at two different intervals during operation. At each time this assessment must capture all four seasons of the year. This assessment may include evaluation of survey data collected through an existing survey program, if data are available for the proposed site."

This FMP will be revised through an iterative process, and survey protocols and methodologies have been and will continue to be refined and updated based on feedback received from stakeholder groups. Much of the research described in this plan will be performed on commercial fishing vessels that are contracted for this monitoring. Further, the field work described in the monitoring plan will be performed by an independent contractor (e.g., local university, research institution, or consulting firm).

Introduction

Sunrise Wind is committed to conducting sound, credible science using the following guiding principles:

- Producing transparent, unbiased, and clear results from all research
- Working with commercial and recreational fishermen to identify areas important to them
- Collecting long-term data sets to determine trends and develop knowledge
- Promoting the smart growth of the American offshore wind industry
- Focusing on maintaining access and navigation in, and around, our wind farms for all ocean users
- Completing scientific research collaboratively with the fishing community
- Being accessible and available to the fishing industry
- Utilizing standardized monitoring protocols when possible and building on and supporting existing fisheries research
- Sharing data with all stakeholder groups
- Maintaining data confidentiality for sensitive fisheries dependent monitoring data

2.0 SUMMARY OF REGIONAL FISHERIES MONITORING

Fishery dependent and independent data were considered throughout the development of this FMP. There are several longstanding fishery independent surveys in the vicinity of the Lease Area and along the Sunrise Wind Export Cable route which provide a time-series of information that can be used to characterize the fish and invertebrate communities prior to the start of offshore construction. In addition, several recent case studies provide high-resolution fisheries independent data for the Wind Energy Areas of southern New England. This section provides a brief synopsis of relevant fisheries-independent monitoring.

Data collected during the Northeast Fisheries Science Center (NEFSC) bottom trawl survey between 2003 and 2014 were synthesized to provide an overview of the species composition in each WEA (Guida et al. 2017). In the MA/RI WEA, little and winter skate were the dominant taxa across all seasons (Guida et al. 2017). Ocean pout, Atlantic herring, windowpane flounder, longhorn sculpin, and yellowtail flounder were dominant taxa during the cold season (i.e., winter and spring surveys), while longfin squid, scup, butterfish, northern sea robin, sea scallops, and spiny dogfish were dominant taxa during the fall surveys (Guida et al. 2017). Within the MA/RI WEA, black sea bass, Atlantic cod, ocean quahog, and sea scallops were noted as species that are commonly present and vulnerable to disturbance from the construction and operation of offshore wind farms.

Seasonal trawl surveys conducted by the Massachusetts Division of Marine Fisheries (MADMF) and the Rhode Island Department of Environmental Management (RIDEM) provide a time-series of relative abundance for fish and invertebrate resources in the nearshore waters of southern New England. Trawl surveys have also been carried out in Narragansett Bay for decades by the University of Rhode Island and RIDEM. The New York State Department of Environmental Conservation initiated the nearshore Ocean Trawl Survey on the R/V Seawolf in the fall of 2017, which samples seasonally from Breezy Point to Block Island Sound, and covers a depth range up to 30 m. The Connecticut Department of Energy and Environmental Protection has conducted a spring (March, April, and May) and fall (September and October) trawl survey within Long Island Sound since 1984, with approximately 200 sites sampled annually using a stratified random design. The Northeast Area Assessment and Monitoring Program (NEAMAP) biannual trawl survey conducts sampling each spring and fall in shallow nearshore waters from Cape Hatters northward to Block Island Sound (Bonzek et al. 2017). Much of the information from these fishery-independent surveys is available through the Northeast Ocean Data Portal (http://www.northeastoceandata.org/) and the Mid-Atlantic Ocean Data Portal (Mid-Atlantic Ocean Data Portal (midatlanticocean.org)) enabling a characterization of the fish and invertebrate resources that may be present in the Lease Area, and also along the SRWEC.

Walsh and Guida (2017) sampled during the spring within the MA/RI WEA using a two-meter beam trawl and an otter trawl net (NEAMAP trawl survey net) and compared the relative abundance, species composition, and length frequency distributions of fish and shellfish that were collected with each sampling gear. The beam trawl more effectively sampled juvenile animals, smaller fish, and invertebrate prey species, while the otter trawl sampled a greater proportion of commercially important demersal and pelagic species. Walsh and Guida (2017) recommended that sampling occur throughout the year to characterize seasonal variation in the species assemblage and suggested that sampling with multiple gear types may provide a more holistic understanding of the fish and invertebrate community.

From December 2015 through April 2016 Siemann and Smolowitz (2017) used scallop dredge surveys to characterize the distribution and habitat preferences of monkfish and flatfish in the southern New England lease areas and used video cameras mounted to a benthic sled to map habitat characteristics. Catches

observed in the dredge survey were compared to samples from the NEFSC spring bottom trawl survey (2011 through 2015).

Malek (2015) used beam trawl and otter trawl collections, along with acoustics and seafloor video surveys to evaluate the fine-scale spatial structure of the demersal fish and invertebrate community in Block Island Sound and Rhode Island Sound. This study documented persistent seasonal variability in the fish and invertebrate community, illustrating the need for year-round monitoring to document the potential impacts from offshore wind development. Further, distinct species assemblages were identified, which were influenced by a combination of physical, oceanographic, and biological factors. This study identified summer flounder, silver hake, black sea bass, American lobster, and sea scallops as indicator species that should be considered when assessing the potential impacts of offshore wind development.

The Fish and Fisheries Study, commissioned by the New York State Energy Research and Development Authority (NYSERDA), synthesized habitat data, fishery-independent data, fishery-dependent data, and information provided by stakeholders within an 'Area of Analysis' off the coast of New York and New Jersey (Ecology and Environment Engineering, P.C. 2017). While the Sunrise Wind Lease Area does not overlap with the 'Area of Analysis', the Sunrise Wind export cable route does cross through this area. The Fish and Fisheries Study provides comprehensive baseline information on the presence, distribution, and habitat use patterns of commercially, recreationally, and ecologically important fish and invertebrate species within the region. The Fish and Fisheries Study also provides spatially explicit data on the geographic patterns of fishing effort and revenue in the area, based on information collected through Vessel Monitoring Systems, Vessel Trip Reports, and stakeholder input.

Estimates of abundance, biomass, and fishing mortality rates derived from stock assessment models can be compared to management reference points to provide a stock-level overview of the health of marine resources that may be found in the Sunrise Wind Lease Area, or along the SRWEC. The stock status of several commercially and recreationally important species in the region is shown in Figure 2. Based on the most recent stock assessment available, of the 16 stocks examined, only the southern Georges/Mid-Atlantic stock of red hake was subject to overfishing (i.e., $F>F_{MSY}$), while seven of the sixteen stocks were considered to be overfished ($B<B_{MSY}$).

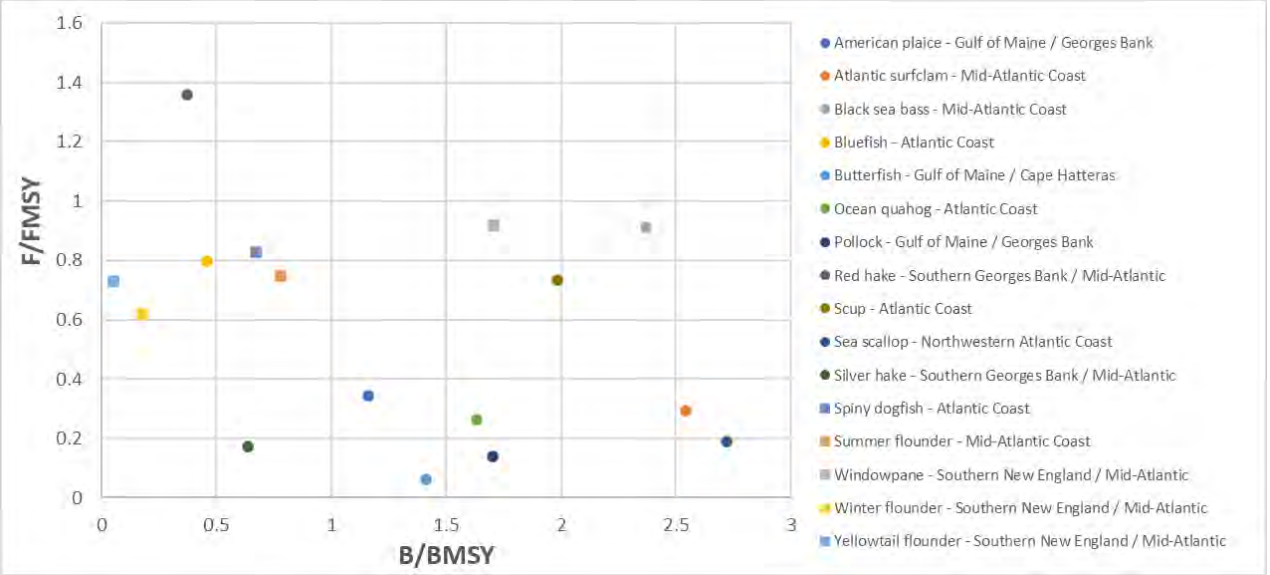

Figure 2. Kobe plot showing the most recently determined stock status for some of the commercially and recreationally important fish stocks that occur in the Sunrise Wind Lease Area and/or along the Sunrise Wind Export Cable Route (data source: NOAA Fisheries 2021).

Additional data sources that can be used to characterize the pre-construction community composition in the area include:

- Industry-based trawl surveys for yellowtail flounder (Valliere and Pierce 2007; Cadrin et al. 2013a) and winter flounder (Cadrin et al. 2013b) in southern New England.
- Trawl surveys and ventless trap surveys conducted to assess the Impacts of the Block Island Wind Farm (CoastalVision 2013; Wilber et al. 2018; Carey et al. 2020).
- Fisheries independent surveys for the sea scallop resource including drop camera surveys (Bethoney et al. 2018), dredge surveys (Hart 2015), and towed-camera surveys (NEFSC 2010).
- The Southern New England Cooperative Ventless Trap Survey (SNECVTS) was funded by BOEM to collect pre-construction information on the relative abundance, demographics and distribution of lobster and Jonah crab in the MA/RI WEA (Collie and King 2016). Sampling occurred from May through November in 2014 and 2015, and another season of sampling occurred in 2018 (Collie and King 2016), and provided high-resolution information on the relative abundance, distribution and demographics of lobsters and Jonah crab within the MA/RI WEA.

Several groups have identified lists of priority species for offshore wind monitoring in southern New England, and those lists were used to inform the selection of target species for monitoring at Sunrise Wind. MADMF acknowledged key assessment indicators species for understanding the cumulative impacts associated with wind farm development after considering several metrics including, but not limited to, commercial value, abundance in fishery-independent surveys, vulnerability to construction, and essential fish habitat (EFH; MADMF 2018). The species identified by MADMF (2018) were yellowtail flounder, winter flounder, summer flounder, monkfish, ocean pout, red hake, black sea bass, longfin squid, Atlantic cod, scup, Jonah crab, lobster, ocean quahog, sea scallop, bluefin tuna, little skate, winter skate, and sharks.

MADMF (2018) also recommended that a range prey species be investigated for cumulative impacts, including sand lance, Atlantic herring, menhaden, and Atlantic mackerel.

The northeast regional Habitat Assessment Prioritization Working Group (NMFS 2015) assessed species on the basis of their habitat dependence, along with their cultural and economic significance. Stocks rated as a 'high' research priority that overlap with the Sunrise Wind lease area or the Export Cable route include Southern New England/Mid-Atlantic winter flounder, wolffish, summer flounder, black sea bass, Georges Bank haddock, Georges Bank cod, sea scallop, thorny skate, Atlantic surfclam, and witch flounder.

Petruny-Parker et al. (2015) used input from a range of stakeholders to identify sampling tools, research needs, and best practices for monitoring of offshore wind development. The authors noted that sampling should be completed in collaboration with the local fishing industry and should employ a variety of gear types to target a range of species that may be impacted. Their report also identified a list of priority species to be considered during research and monitoring that included alewife, American lobster, Atlantic cod, Atlantic herring, Atlantic sturgeon, black sea bass, blueback herring, bluefish, blue mussels, butterfish, haddock, Jonah crabs, little/winter skates, longfin squid, mackerels, mako shark, menhaden, monkfish, ocean quahogs, pollock, red hake, sea scallops, scup, silver hake, spiny dogfish, striped bass, summer flounder, surf clams, thresher shark, tunas, winter flounder, and yellowtail flounder. Petruny-Parker et al. (2015) also highlighted the need for seasonal sampling prior to construction and recommended that two to three years of monitoring should occur prior to the commencement of offshore construction.

Regional monitoring studies have been recommended to better understand the cumulative impact of offshore wind development on marine resources and the fishing community, and there has been a call for developers to standardize their monitoring approaches to the extent practicable to help understand cumulative impacts of offshore wind development (McCann 2012; MADMF 2018). While this FMP was developed with an emphasis on the species and fisheries that are most important in the SRWF, the monitoring tools and protocols described herein were selected to complement the regional monitoring described above, as well as planned and ongoing data collection efforts by Orsted, other offshore wind developers, and state and federal agencies in the region.

3.0 BASELINE CONDITIONS

This section summarizes the existing conditions within the Lease Area and along the SRWEC which were considered in development of this FMP. Complete details regarding baseline conditions in the Lease Area and along the SRWEC are available in the Project's Construction and Operations Plan (website link to be provided upon publication).

3.1 HABITAT CONSIDERATIONS

Species with EFH designations for one or more life stages within the Lease Area and/or along the SRWEC include the following:

- New England Fish – American plaice, Atlantic cod, Atlantic herring, Atlantic wolffish, barndoor skate, haddock, little skate, monkfish, ocean pout, offshore hake, pollock, red hake, silver hake, white hake, windowpane flounder, winter flounder, winter skate, witch flounder, and yellowtail flounder.
- Mid-Atlantic Fish – Atlantic butterfish, Atlantic mackerel, black sea bass, bluefish, scup, and summer flounder.
- Invertebrates – Atlantic sea scallop, Atlantic surfclam, longfin squid, shortfin squid, and ocean quahog.
- Highly Migratory Species – albacore tuna, bluefin tuna, skipjack tuna, and yellowfin tuna.
- Sharks – basking shark, blue shark, common thresher shark, dusky shark, porbeagle shark, sandbar shark, sand tiger shark, shortfin mako shark, smooth dogfish, spiny dogfish, tiger shark, and white shark

3.2 FISHING ACTIVITY IN THE REGION

Commercial fishing activity in the SRWF and along the SRWEC was characterized using Vessel Monitoring System (VMS) (e.g., Northeast Ocean Data Portal) and Vessel Trip Report (VTR) data (NOAA Fisheries site, data request), information provided in the Ocean SAMP (RICRMC 2018), through conversations between commercial fishermen and Orsted's fisheries liaisons.

Recently, NOAA Fisheries developed a website presenting fishing effort and revenue data from each proposed offshore wind lease area along the US East Coast[2]. The socioeconomic summaries combine data from VTRs and Dealer Reports to summarize fisheries activity, revenue, and landings annually within each offshore wind lease area. It is acknowledged that the NOAA website does not capture fishing activity for vessels that do not have a VTR requirement (e.g., some highly migratory species permitted vessels and federally permitted lobster vessels), however, the data summaries do provide a broad overview of the characteristics of fishing effort within each lease site. Several federally permitted fisheries operate in the SRWF. From 2008 through 2019, the highest number of trips taken within the SRWF occurred in 2008, 2009, and 2016 (Table 1). From 2017 through 2019, fewer fishing trips were reported to occur in the SRWF, and fewer vessels fished within the SRWF compared to the prior nine years (Table 1).

[2] https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development

Table 1. Summary of Federal Economic Fishing Data for the SRWF, by Number of Trips and Vessels, for 2008 to 2019

Year	Number of Trips	Number of Vessels
2019	2,959	267
2018	4,003	258
2017	4,595	286
2016	5,478	319
2015	4,846	293
2014	5,035	319
2013	5,358	315
2012	5,051	292
2011	4,524	265
2010	5,058	267
2009	5,929	315
2008	5,941	329

In terms of individual fishing ports, Point Judith, RI and New Bedford, MA accounted for the greatest number of fishing trips within the SRWF in 2019 (Table 2). Point Judith, RI had the greatest number of vessels fish in the SRWF in 2019, while New Bedford, MA, Montauk, NY, Beaufort, NC, and Stonington, CT all had greater than 10 vessels fish in the SRWF during 2019 (Table 2).

Table 2. Summary of Federal Economic Fishing Data for the SRWF, by Number of Trips and Vessels, for Ports

Port	Number of Trips	Number of Vessels
Beaufort, NC	30	15
Boston, MA	10	4
Cape May, NJ	5	4
Fairhaven, MA	22	8
Hampton, VA	11	9
Little Compton, RI	187	10
Menemsha, MA	92	6
Montauk, NY	73	20
New Bedford, MA	446	80
New London, CT	39	4
Newport News, VA	11	10
Newport, RI	106	6
Point Judith, RI	1,613	93
Point Pleasant, NJ	16	9
Stonington, CT	68	12
Wanchese, NC	8	6
Westport, MA	92	9

From 2009 through 2019, the bottom trawl fishery accounted for the highest revenue and landings in the SRWF (Table 3). The VMS data for the groundfish fleet (large-mesh multispecies or northeast multispecies) for the years 2011 to 2016 indicated the highest density of fishing activity in the northwestern portion of the SRWF, with some areas of medium to high effort in the southwestern portion of the Lease Area, and less effort elsewhere in the Lease Area (Appendix A, Figures A-1 and A-2). Other fisheries that routinely operate in the SRWF include the pot fishery for lobsters and crabs, the sink gillnet fishery, the scallop dredge fishery, and the midwater trawl fishery (Table 3). VMS data indicated that the fishery routinely targeted monkfish throughout the SRWF from 2011 to 2016 (Appendix A, Figures A-3 and A-4), and the importance of the monkfish fishery is reflected in the landings data which demonstrate that monkfish provided the greatest mean annual fishery revenue from the SRWF from 2008 through 2019 (Table 4). In 2014 the pelagic fisheries for herring, mackerel, and squid primarily operated in the southwestern portion of the SRWF (Appendix A, Figure A-5). However, fishing intensity increased for pelagic species in the SRWF from 2015 through 2016 and the fishery operated mainly in the northwestern corner of the SRWF (Appendix A, Figure A-6), reflecting the dynamic distribution of these pelagic species. Dredge fisheries for surfclam and ocean quahog operated throughout the SRWF from 2012 to 2014 (Appendix A, Figure A-7), while fishing effort was generally concentrated in western and central portions of the SRWF from 2015 through 2016 (Appendix A, Figure A-8). Scallops represented the second most valuable species harvested in the SRWF Lease Area from 2008 through 2019 (Table 4). The scallop dredge fishing intensity was relatively low throughout the SRWF from 2011 to 2014, but the amount of scallop effort increased in 2015 and 2016; primarily in the central portion of the SRWF Lease Area

(Appendix A, Figures A-9 and A-10). Spatial information on lobster effort is more limited due to reporting requirements in that fishery, but the Ocean SAMP documents indicate that fixed gear is fished throughout the MA/RI WEA (RICRMC 2018), and the fishery-dependent data indicate that lobsters and Jonah crabs were a notable source of revenue and landings within the SRWF Lease Area (Table 4). The for-hire recreational fishery mainly operates in the southwest portion of the MA/RI WEA, including Cox Ledge and the South Fork Wind Farm Project lease area, to the north of the SRW Lease Area (RICRMC 2018).

It is noted that fisheries dependent data is heavily influenced by fisheries management, including seasonal and spatial closures that are designed to limit mortality, protect sensitive habitats or activities (e.g., spawning) or fulfill another management objective. Therefore, the fisheries dependent data summarized within this section should not be assumed to be wholly representative of the underlying abundance and availability of commercially and recreationally important species within the Lease Area.

Table 3. Summary of revenue and landings from federal VTR data, by gear type, for vessels fishing in the SRWF area from 2009 through 2018 (INSPIRE Environmental 2021a). VTR data requested for SRWF included a 1-km buffer to account for potential activities around the margins of the wind farm.

	Annual Average Revenue and Landings from within SRWF		Annual Average of Total Revenue and Landings from ME to NC		Percent of Total Species Values in SRWF	
Gear Type	**Revenue ($)**	**Landings (lb)**	**Revenue ($)**	**Landings (lb)**	**% of Revenue**	**% of Landings**
Trawl-Bottom	692,726	955,748	46,873,675	32,325,747	1.48	2.96
Gillnets	615,420	734,490	48,830,995	64,380,863	1.26	1.14
Dredge	325,759	729,330	370,548,263	115,687,777	0.09	0.63
Pot	203,481	97,674	623,584,075	251,757,638	0.03	0.04
Trawl-Midwater	23,680	203,732	14,479,983	96,249,236	0.16	0.21
Hand	3,543	1,206	16,476,037	5,249,404	0.02	0.02
Longlines	918	301	36,141,740	20,608,637	<0.01	<0.01
Total	1,865,527	2,722,481	1,156,934,768	586,259,302	0.16	0.46

Source: NOAA Fisheries 2020; Atlantic Coastal Cooperative Statistics Program (ACCSP) 2020b
Notes:
Values are sorted from largest to smallest revenue values for landings data.
Landings are reported in landed pounds.
Revenue is reported in nominal dollars.
"Total" revenue and landings values refer to all fishing activity as reported by VTRs for fisheries active in state and federal waters from Maine to North Carolina.

From 2008 through 2019 federal VTR revenue and landings data from the SRWF indicate that monkfish accounted for the greatest revenue (Table 4). Aside from monkfish, the species or species groups that provided the greatest revenues from the SRWF were scallops, flatfish, skate (wings), lobster, loligo squid, and hakes (Table 4).

Based on federal VTR data, fishing vessels from Rhode Island and Massachusetts accounted for the majority of landings and revenue from the SRWF area between 2009 and 2018 (Table 5).

Table 4. Summary of revenue and landings from federal VTR data, by individual species, for vessels fishing in the SRWF area from 2009 to 2018 (INSPIRE Environmental 2021a). VTR data requested for SRWF included a 1-km buffer to account for potential activities around the margins of the wind farm.

	Annual Average Revenue and Landings from within SRWF		Annual Average of Total Revenue and Landings from ME to NC		Percent of Total Species Values in SRWF	
Species	Revenue ($)	Landings (lb)	Revenue ($)	Landings (lb)	% of Revenue	% of Landings
Monkfish	409,960	277,068	20,227,155	19,974,755	2.03	1.39
Scallops/Bushel	267,163	25,896	482,923,974	49,154,784	0.06	0.05
Flounders	262,740	108,886	53,134,241	23,095,652	0.49	0.47
Skate Wings	229,704	656,718	2,745,248	10,558,473	8.37	6.22
Lobster, American	143,612	30,729	508,376,902	138,393,661	0.03	0.02
Squid / Loligo	120,534	100,964	28,808,682	24,553,538	0.42	0.41
Hakes	88,384	175,770	15,734,072	20,616,926	0.56	0.85
Scup	78,947	128,792	9,282,234	14,365,155	0.85	0.90
Quahogs/Bushel	57,763	85,207	11,515,763	15,885,026	0.50	0.54
Cod	50,622	20,666	14,976,920	8,631,140	0.34	0.24
Crab, Jonah	46,037	59,144	10,984,715	14,430,188	0.42	0.41
Herring, Atlantic	35,617	269,766	26,547,928	166,518,782	0.13	0.16
Butterfish	20,939	30,032	2,182,611	3,343,738	0.96	0.90
Dogfish, Spiny	15,940	88,845	3,621,344	18,797,259	0.44	0.47
Black Sea Bass	14,680	3,762	8,062,043	2,482,044	0.18	0.15
Whelk, Channeled/Bushel	5,600	752	7,209,932	1,241,043	0.08	0.06
Mackerel, Atlantic	5,015	26,616	3,889,784	16,598,279	0.13	0.16
Bluefish	4,086	6,184	2,795,762	4,626,369	0.15	0.13
Striped Bass	3,676	861	18,993,967	6,042,232	0.02	0.01
Squid / Illex	2,849	2,960	9,740,364	23,566,822	0.03	0.01
Crab, Rock/Bushel	2,637	4,425	905,105	1,934,725	0.29	0.23
Tilefish, Golden	1,975	614	5,140,209	1,697,154	0.04	0.04
Cunner	1,054	257	20,411	6,394	5.16	4.02
Dogfish, Smooth	791	2,460	975,814	2,038,524	0.08	0.12
Tautog	729	232	939,764	277,524	0.08	0.08
Weakfish	494	254	911,459	480,366	0.05	0.05
Bonito	325	125	112,991	53,483	0.29	0.23
Whiting, King / Kingfish	305	345	901,080	808,024	0.03	0.04
Sea Raven	186	143	2,735	2,214	6.80	6.46
Croaker, Atlantic	156	394	7,545,945	9,430,649	<0.01	<0.01
Pollock	98	98	9,248,825	10,614,877	<0.01	<0.01
Halibut, Atlantic	75	10	814,873	131,652	0.01	0.01
Tuna, Little	73	108	132,156	233,922	0.06	0.05
Crab, Species Not Specified	27	55	104,592	234,054	0.03	0.02

Baseline Conditions

	Annual Average Revenue and Landings from within SRWF		Annual Average of Total Revenue and Landings from ME to NC		Percent of Total Species Values in SRWF	
Species	**Revenue ($)**	**Landings (lb)**	**Revenue ($)**	**Landings (lb)**	**% of Revenue**	**% of Landings**
Sea Robins	24	156	20,363	111,941	0.12	0.14
Triggerfish	21	16	305,237	156,878	0.01	0.01
Crab, Blue/Bushel	19	23	122,113,419	101,094,748	<0.01	<0.01
Eel, American	14	17	11,743,242	737,151	<0.01	<0.01
Whelk, Knobbed/Bushel	10	5	1,072,305	652,175	<0.01	<0.01
Skate Wings, Clearnose	8	22	151,764	63,015	0.01	0.03
Ocean Pout	6	6	467	565	1.28	1.06
Redfish / Ocean Perch	4	6	4,433,221	7,839,842	<0.01	<0.01
Shark, Thresher	4	6	55,444	116,584	0.01	0.01
Tilefish, Blueline	4	2	472,282	223,867	<0.01	<0.01
Mackerel, Spanish	2	1	1,192,721	816,870	<0.01	<0.01
Mullets	2	3	11,018	20,601	0.02	0.01
Scallops, Bay/Shells	2	0	3,715,767	230,219	<0.01	<0.01
Spot	2	7	3,139,995	2,828,429	<0.01	<0.01
Total	1,872,915	2,109,408	1,417,936,845	725,712,313	0.13	0.29

Source: NOAA Fisheries 2020; ACCSP 2020a
Notes:
Values are sorted from largest to smallest revenue values for landings data.
Landings are reported in landed pounds.
Revenue is reported in nominal dollars.
“Total” revenue and landings values refer to all fishing activity as reported by VTRs for fisheries active in state and federal waters from Maine to North Carolina.

Table 5. Summary of landings and revenue from federal VTR data, by state, for vessels fishing in the SRWF area from 2009 to 2018 (INSPIRE Environmental 2021a). VTR data requested for SRWF included a 1-km buffer to account for potential activities around the margins of the wind farm.

	Annual Average Revenue and Landings from within SRWF		Annual Average of Total Revenue and Landings from ME to NC		Percent of Total Species Values in SRWF	
State	Revenue ($)	Landings (lb)	Revenue ($)	Landings (lb)	% of Revenue	% of Landings
Rhode Island	1,204,910	2,315,036	83,805,129	83,065,993	1.44	2.79
Massachusetts	1,195,615	8,029,481	547,853,119	272,472,579	0.22	2.95
New York	50,480	36,015	53,574,875	30,798,644	0.09	0.12
All Others	27,542	19,678	927,861,542	818,492,359	<0.01	<0.01
Connecticut	27,043	26,087	16,233,218	8,827,386	0.17	0.30
New Jersey	13,752	68,792	172,916,683	160,313,907	0.01	0.04
Total	2,519,342	10,495,089	1,802,244,566	1,373,970,868	0.14	0.76

Source: NOAA Fisheries 2020; ACCSP 2020a
Notes:
Values are sorted from largest to smallest revenue values for landings data.
Landings are reported in landed pounds.
Revenue is reported in nominal dollars.
"All Others" includes North Carolina, Virginia, Maryland, Delaware, New Hampshire, and Maine.
"Total" revenue and landings values refer to all fishing activity as reported by VTRs for fisheries active in state and federal waters from Maine to North Carolina.

Several federally permitted fisheries are active along the approximately 106-mi (170-km) SRWEC. An estimate of revenues and landings associated with the SRWEC were generated using a 10-km wide buffer around the SRWEC (5 km on either side of the SRWEC centerline). The 10-km buffer was intended to provide a reasonable geographic extent for fisheries that may occur in and around the SRWEC corridor. Based on VTR data, the gear types that generated the greatest revenues and landings along the SRWEC were dredge, bottom trawl, gillnet, pot, midwater trawl, and by hand fisheries (Table 6). VMS data indicate a high density of effort from the sea scallop (Appendix A, Figures A-9 and A-10) and surfclam/ocean quahog fisheries (Appendix A, Figures A-7 and A-8) along portions of the SRWEC during 2011 to 2016, particularly in areas closer to the cable landfall location and near the southwestern corner of the SRWF. There were also areas of high fishing activity for monkfish and large-mesh groundfish-species along the SRWEC in waters nearest the SRWF from 2011 to 2014 (Appendix A, Figures A-1 and A-3), however, the intensity of fishing effort in this area was reduced for both of these fisheries from 2015 through 2016 (Appendix A, Figures A-2 and A-4). Fishing effort for pelagic species (herring/mackerel/squid), increased along the SRWEC route in 2015 to 2016 (Appendix A, Figures A-5 and A-6). VMS data suggest there was little directed fishing effort for Atlantic herring along the SRWEC (Appendix A, Figures A-11 and A-12), while effort in the squid fishery increased from 2015 through 2016, relative to the preceding four years (Appendix A, Figures A-13 and A-14).

Table 6. Summary of Federal VTR Data, by Gear Type, for Vessels Fishing along the 10-km SRWEC Route Buffer Zone from 2009 to 2018 (INSPIRE Environmental 2021a)

	Annual Average Revenue and Landings from within SRWEC Fisheries Study Corridor		Annual Average of Total Revenue and Landings from ME to NC		Percent of Total Species Values in SRWEC Fisheries Study Corridor	
Gear Type	Revenue ($)	Landings (lb)	Revenue ($)	Landings (lb)	% of Revenue	% of Landings
Dredge	6,078,125	11,729,188	370,548,263	115,687,777	1.64	10.14
Trawl-Bottom	2,000,054	1,924,041	46,873,675	32,325,747	4.27	5.95
Gillnets	1,045,768	909,037	48,830,995	64,380,863	2.14	1.41
Pot	227,393	161,283	623,584,075	251,757,638	0.04	0.06
Trawl-Midwater	129,609	1,123,851	14,479,983	96,249,236	0.90	1.17
Hand	12,363	6,222	16,476,037	5,249,404	0.08	0.12
Longlines	1,502	600	36,141,740	20,608,637	<0.01	<0.01
Total	9,494,814	15,854,222	1,156,934,768	586,259,302	0.82	2.70

Source: NOAA Fisheries 2020; ACCSP 2020b
Notes:
Values are sorted from largest to smallest revenue values for landings data.
Landings are reported in landed pounds.
Revenue is reported in nominal dollars.
"Total" revenue and landings values refer to all fishing activity as reported by VTRs for fisheries active in state and federal waters from Maine to North Carolina.

Sea scallops generated the greatest revenue for federally permitted vessels fishing within the 10-km SRWEC route buffer zone, followed by monkfish, ocean quahog, squid, flounders, skates, and scup (Table 7). Federally permitted vessels with home ports in Massachusetts, New York, and Rhode Island accounted for the vast majority of landings and revenue within the 10-km SRWEC route buffer zone (Table 8).

Table 7. Summary of Federal VTR Data, by Top Individual Species, for Vessels Fishing along the 10-km SRWEC Route Buffer Zone from 2009 to 2018 (INSPIRE Environmental 2021a)

	Annual Average Revenue and Landings from within SRWEC Fisheries Study Corridor		Annual Average of Total Revenue and Landings		Percent of Total Species Values in SRWEC Fisheries Study Corridor	
Species	Revenue	Landings	Revenue	Landings	% of Revenue	% of Landings
Scallops/Bushel	5,366,174	545,650	482,923,974	49,154,784	1.11	1.11
Monkfish	885,498	549,267	20,227,155	19,974,755	4.38	2.75
Quahogs/Bushel	849,674	1,349,941	11,515,763	15,885,026	7.38	8.50
Squid / Loligo	676,904	598,372	28,808,682	24,553,538	2.35	2.44
Flounders	616,681	236,811	53,134,241	23,095,652	1.16	1.03
Skate Wings	227,213	652,002	2,745,248	10,558,473	8.28	6.18
Scup	194,697	275,921	9,282,234	14,365,155	2.10	1.92
Herring, Atlantic	152,910	1,232,545	26,547,928	166,518,782	0.58	0.74
Lobster, American	113,790	24,503	508,376,902	138,393,661	0.02	0.02
Crab, Jonah	84,948	117,578	10,984,715	14,430,188	0.77	0.81
Hakes	68,292	105,459	15,734,072	20,616,926	0.43	0.51

Baseline Conditions

	Annual Average Revenue and Landings from within SRWEC Fisheries Study Corridor		Annual Average of Total Revenue and Landings		Percent of Total Species Values in SRWEC Fisheries Study Corridor	
Species	Revenue	Landings	Revenue	Landings	% of Revenue	% of Landings
Black Sea Bass	54,638	14,757	8,062,043	2,482,044	0.68	0.59
Striped Bass	49,574	13,259	18,993,967	6,042,232	0.26	0.22
Cod	38,912	18,411	14,976,920	8,631,140	0.26	0.21
Mackerel, Atlantic	28,407	146,979	3,889,784	16,598,279	0.73	0.89
Bluefish	18,138	26,001	2,795,762	4,626,369	0.65	0.56
Butterfish	16,258	23,393	2,182,611	3,343,738	0.74	0.70
Clam, Surf/Bushel	9,464	13,402	28,970,372	39,277,659	0.03	0.03
Dogfish, Spiny	9,395	45,322	3,621,344	18,797,259	0.26	0.24
Dogfish, Smooth	7,897	14,025	975,814	2,038,524	0.81	0.69
Tilefish, Golden	7,127	2,362	5,140,209	1,697,154	0.14	0.14
Eel, American	5,919	288	11,743,242	737,151	0.05	0.04
Crab, Rock/Bushel	3,479	6,644	905,105	1,934,725	0.38	0.34
Weakfish	3,071	1,737	911,459	480,366	0.34	0.36
Whelk, Channeled/Bushel	2,060	507	7,209,932	1,241,043	0.03	0.04
Tautog	2,021	640	939,764	277,524	0.22	0.23
Whiting, King / Kingfish	1,676	1,838	901,080	808,024	0.19	0.23
Squid / Illex	948	1,277	9,740,364	23,566,822	0.01	0.01
Menhaden	945	9,595	36,050,402	410,062,789	<0.01	<0.01
Croaker, Atlantic	849	1,248	7,545,945	9,430,649	0.01	0.01
Bonito	824	417	112,991	53,483	0.73	0.78
Whelk, Waved	755	1,180	167,288	310,836	0.45	0.38
Cunner	462	171	20,411	6,394	2.26	2.67
Tuna, Little	372	574	132,156	233,922	0.28	0.25
Pollock	268	289	9,248,825	10,614,877	<0.01	<0.01
Triggerfish	263	172	305,237	156,878	0.09	0.11
Crab, Species Not Specified	260	552	104,592	234,054	0.25	0.24
Crab, Horseshoe	257	240	1,549,706	2,075,840	0.02	0.01
Whelk, Knobbed/Bushel	182	133	1,072,305	652,175	0.02	0.02
Sea Robins	174	786	20,363	111,941	0.85	0.70
Spot	158	239	3,139,995	2,828,429	0.01	0.01
Crab, Blue/Bushel	128	136	122,113,419	101,094,748	<0.01	<0.01
Mackerel, Spanish	113	54	1,192,721	816,870	0.01	0.01
Shark, Thresher	110	85	55,444	116,584	0.20	0.07
Herring, Blue Back	93	400	846	3,212	10.99	12.45
Halibut, Atlantic	88	14	814,873	131,652	0.01	0.01
Sea Raven	84	80	2,735	2,214	3.07	3.61
Whelk, Lightning	68	32	752	358	9.04	8.94

Baseline Conditions

	Annual Average Revenue and Landings from within SRWEC Fisheries Study Corridor		Annual Average of Total Revenue and Landings		Percent of Total Species Values in SRWEC Fisheries Study Corridor	
Species	**Revenue**	**Landings**	**Revenue**	**Landings**	**% of Revenue**	**% of Landings**
Scallops, Bay/Shells	64	6	3,715,767	230,219	<0.01	<0.01
Skate Wings, Clearnose	63	194	151,764	63,015	0.04	0.31
Ocean Pout	62	76	467	565	13.28	13.45
Mullets	39	49	11,018	20,601	0.35	0.24
Tilefish, Blueline	34	19	472,282	223,867	0.01	0.01
Swordfish	27	6	4,856,707	1,630,752	<0.01	<0.01
Shad, American	25	41	241,660	217,897	0.01	0.02
Shad, Hickory	8	10	32,427	102,845	0.02	0.01
Dolphin Fish / Mahi-Mahi	4	1	951,846	347,011	<0.01	<0.01
Redfish / Ocean Perch	3	5	4,433,221	7,839,842	<0.01	<0.01
Tuna, Skipjack	2	2	5,109	5,748	0.04	0.03
Tilefish, Sand	2	1	659	846	0.30	0.12
Crevalle	1	1	5,236	7,147	0.02	0.01
Perch, White	1	1	932,971	1,180,489	<0.01	<0.01
Total	9,502,553	6,035,700	1,491,702,826	1,180,935,742	0.64	0.51

Source: NOAA Fisheries 2020; ACCSP 2020a
Notes:
Values are sorted from largest to smallest revenue values for landings data.
Landings are reported in landed pounds.
Revenue is reported in nominal dollars.
“Total” revenue and landings values refer to all fishing activity as reported by VTRs for fisheries active in state and federal waters from Maine to North Carolina.

Table 8. Summary of Federal VTR Data, by State, for Vessels Fishing along the 10-km SRWEC Route Buffer Zone from 2009 to 2018 (INSPIRE Environmental 2021a)

	Annual Average Revenue and Landings from within SRWEC Fisheries Study Corridor		Annual Average of Total Revenue and Landings from ME to NC		Percent of Total Species Values in SRWEC Fisheries Study Corridor	
State	Revenue ($)	Landings (lb)	Revenue ($)	Landings (lb)	% of Revenue	% of Landings
Massachusetts	6,258,440	26,350,839	547,853,119	272,472,579	1.14	9.67
New York	1,827,185	1,310,390	53,574,875	30,798,644	3.41	4.25
Rhode Island	1,426,204	1,831,279	83,805,129	83,065,993	1.70	2.20
New Jersey	711,336	2,656,196	172,916,683	160,313,907	0.41	1.66
Connecticut	596,378	349,434	16,233,218	8,827,386	3.67	3.96
All Others	228,405	108,253	927,861,542	818,492,359	0.02	0.01
Total	11,047,948	32,606,391	1,802,244,566	1,373,970,868	0.61	2.37

Source: NOAA Fisheries 2020; ACCSP 2020a
Notes:
Values are sorted from largest to smallest revenue values for landings data.
Landings are reported in landed pounds.
Revenue is reported in nominal dollars.
"All Others" includes North Carolina, Virginia, Maryland, Delaware, New Hampshire, and Maine.
"Total" revenue and landings values refer to all fishing activity as reported by VTRs for fisheries active in state and federal waters from Maine to North Carolina.

A number of fisheries also occur in NY state waters along the SRWEC. From 2009 to 2019 the pots and traps fisheries had mean annual landings of 890,393 pounds in statistical areas 611, 612, and 613 combined, accounting for 92.6% of the statewide landings for this gear type (Table 9; ACCSP 2020c). The gillnet fishery represented the second largest fishery, followed by dredge, and other fixed nets. Species with the highest average annual landings by weight for statistical areas 611, 612, and 613 combined included Atlantic surfclam (1,132,898 pounds), menhaden (682,384 pounds), and striped bass (571,352 pounds) (Table 10). For several species, landings from the three statistical areas account for over 90 percent of statewide landings; these species include menhaden, striped bass, scup, horseshoe crab, bluefish, American lobster, summer flounder, longfin squid, whelks, tautog, black sea bass, butterfish, green crab, conchs, skates, and others (INSPIRE Environmental 2021a).

Table 9. Summary of Landings, by Statistical Area and Gear Type, for State-only Permitted Fishing Vessels from New York from 2009 to 2019 (INSPIRE Environmental 2021a)

	Average Pounds Landed per Year (2009-2019)			Total Pounds Landed (2009-2019)			Total Pounds Landed in New York State Waters (2009-2019)	% Pounds Landed out of Total New York State Waters, by Gear		
	Statistical Areas			Statistical Areas				Statistical Areas		
Gear Type	611	612	613	611	612	613		611	612	613
Beam Trawls	6,787			13,574			27,149	50.0		
By Hand, Diving Gear	876	785	1,618	5,257	5,493	14,565	50,631	10.4	10.8	28.8
By Hand, No Diving Gear	92,293	180,262	70,911	922,925	1,802,624	709,114	3,492,529	26.4	51.6	20.3
Dip Nets	87,330	129,974	902	785,966	1,299,738	8,115	2,094,418	37.5	62.1	0.4
Dredge	10,712	259,240	358,147	107,121	2,073,918	3,223,324	5,489,942	2.0	37.8	58.7
Fyke Nets	879	2,835	6,281	3,515	14,176	56,532	148,445	2.4	9.5	38.1
Gill Nets	119,850	91,198	422,030	1,198,502	911,975	4,220,301	6,808,594	17.6	13.4	62.0
Hand Line	325	266	701	2,276	2,127	2,802	14,434	15.8	14.7	19.4
Hook and Line	241,226	85,205	71,580	2,412,257	852,048	715,803	3,981,848	60.6	21.4	18.0
Not Coded		168,974	321,497		1,351,794	2,250,477	35,377,057		3.8	6.4
Other Fixed Nets	496,586		51,744	4,469,275		413,955	4,906,178	91.1		8.4
Other Gears	27,100	13,806	8,632	81,300	41,418	17,264	143,452	56.7	28.9	12.0
Other Seines	148,657	22,662	29,287	1,337,916	203,959	263,581	1,805,980	74.1	11.3	14.6
Other Trawls	12,873	2,184	27,159	90,109	6,552	81,478	178,277	50.5	3.7	45.7
Otter Trawls	116,127	5,312	33,500	1,161,266	15,937	201,001	1,393,011	83.4	1.1	14.4
Otter Trawls, Bottom	303,080	4,317	178,455	3,030,797	43,168	1,606,093	4,680,057	64.8	0.9	34.3
Pots & Traps, Lobster	64,291	1,603		642,909	11,224		655,590	98.1	1.7	
Pots and Traps	353,061	436,167	101,165	3,530,615	4,361,672	1,011,647	9,607,954	36.7	45.4	10.5
Pound Nets	149,644		17,843	1,496,444		142,743	1,639,788	91.3		8.7
Rakes		3,982	8,176		35,835	32,702	171,270		20.9	19.1
Total	2,231,697	1,408,772	1,709,628	21,292,025	13,033,656	14,971,496	82,666,604	25.8	15.8	18.1

Source: ACCSP 2020c
Notes: Values reflect pounds landed, caught in statistical areas relevant to Sunrise Wind.
Confidential information was redacted from the ACCSP data set.
Blank cells indicate those years when the fishing area had no reported landings or redacted confidential landings.
Average pounds landed were calculated as an arithmetic mean, using the sum of pounds landed and the count of distinct years, ignoring zero years.

Table 10. Top species landed by New York state-only permitted vessels during 2009-2019 in statistical areas 611, 612 and 613 (INSPIRE Environmental 2021a). The table was truncated to only include species with >80,000lbs of total landings from 2009-2019.

	Average Pounds Landed per Year (2009-2019)			Total Pounds Landed (2009-2019)			Total Pounds Landed in New York State Waters (2009-2019)	% Pounds Landed out of Total New York State Waters, by Species		
	Statistical Areas			Statistical Areas				Statistical Areas		
Species	611	612	613	611	612	613		611	612	613
Clam, Surf, Atlantic	6,282	426,740	699,876	12,563	2,560,438	4,899,134	23,024,721	0.1	11.1	21.3
Clam, Quahog, Northern			61,875			556,879	12,017,603			4.6
Menhadens	404,906	172,771	104,707	4,049,061	1,900,481	1,151,779	7,101,921	57.0	26.8	16.2
Bass, Striped	205,430	53,489	312,433	2,259,733	588,378	3,436,764	6,285,503	36.0	9.4	54.7
Scup	441,670	4,801	27,117	4,858,369	52,810	298,284	5,210,427	93.2	1.0	5.7
Crab, Blue	7,784	355,090	22,470	85,628	3,905,993	247,168	4,727,543	1.8	82.6	5.2
Crab, Horseshoe	110,597	187,684	96,529	1,216,571	2,064,523	1,061,814	4,450,252	27.3	46.4	23.9
Bluefish	267,280	19,097	87,923	2,940,079	210,064	967,158	4,117,315	71.4	5.1	23.5
Clam, Razor, Atlantic	989	235	16,106	4,946	1,174	128,852	3,530,524	0.1	<0.1	3.6
Lobster, American	185,999	14,112	34,636	2,045,992	98,782	242,449	2,539,913	80.6	3.9	9.5
Flounder, Summer	128,909	19,119	24,345	1,417,996	210,313	267,793	1,896,102	74.8	11.1	14.1
Whelks	117,881	8,714	2,895	1,296,687	95,853	28,949	1,421,489	91.2	6.7	2.0
Squid, Longfin Loligo	20,615	443	108,465	226,765	2,660	1,084,645	1,314,070	17.3	0.2	82.5
Whelk, Channeled	78,783	24,474	24,213	866,614	220,262	217,915	1,304,791	66.4	16.9	16.7
Tautog	54,737	25,065	2,051	602,110	275,716	22,562	900,530	66.9	30.6	2.5
Bass, Black Sea	58,778	4,693	12,244	646,558	51,623	134,680	833,258	77.6	6.2	16.2
Butterfish	60,114	1,098	4,649	661,253	10,980	51,142	723,375	91.4	1.5	7.1
Crab, Jonah	2,379	64,107	22,498	16,652	256,426	224,977	621,906	2.7	41.2	36.2
Menhaden, Atlantic		8,350			58,451		533,887		10.9	
Crab, Green	4,010	38,772	6,541	32,076	426,497	58,872	520,989	6.2	81.9	11.3
Skates, Rajidae (Family)	4,225	64	33,765	46,471	193	337,648	384,312	12.1	0.1	87.9
Scallop, Bay	30,760	10	4,436	338,355	20	44,362	382,737	88.4	<0.1	11.6
Shark, Dogfish, Smooth	24,614	1,165	6,051	270,750	10,483	66,561	347,794	77.8	3.0	19.1
Crab, Atlantic Rock	6,192	20,678	1,601	61,922	227,456	8,006	299,974	20.6	75.8	2.7
Skates, Raja (Genus)	5,228		23,522	57,505		235,215	292,728	19.6		80.4
Silversides, Atherinidae (Family)	6,818	18,391	6,996	47,729	165,520	69,961	283,210	16.9	58.4	24.7
Eel, American	3,789	12,092	5,078	41,680	133,014	55,857	256,128	16.3	51.9	21.8
Herring, Atlantic	12,498	436	5,154	137,473	3,492	36,076	177,041	77.7	2.0	20.4
Crabs, Spider	8,224	9,224	3,471	57,567	64,570	20,824	176,461	32.6	36.6	11.8
Weakfish	8,038	1,294	6,549	88,419	14,238	72,041	174,698	50.6	8.1	41.2
Goosefish	833		9,441	8,331		103,851	112,286	7.4		92.5
Searobins, North American	10,484	246	2,722	83,871	1,721	21,774	107,366	78.1	1.6	20.3
Windowpane	6,736		2,386	74,094		26,242	101,200	73.2		25.9
Whelk, Knobbed	6,915	1,499	2,934	76,069	7,497	17,602	101,168	75.2	7.4	17.4

Baseline Conditions

	Average Pounds Landed per Year (2009-2019)			Total Pounds Landed (2009-2019)			Total Pounds Landed in New York State Waters (2009-2019)	% Pounds Landed out of Total New York State Waters, by Species		
	Statistical Areas			Statistical Areas				Statistical Areas		
Species	611	612	613	611	612	613		611	612	613
Conchs	45,968		320	91,935		320	92,255	99.7		0.3
Herrings, River		8,089			88,974		89,152		99.8	

Source: ACCSP 2020c
Notes: Values reflect pounds landed, caught in statistical areas relevant to Sunrise Wind.
Confidential information was redacted from the ACCSP data set.
Blank cells indicate those years when the fishing area had no reported landings or redacted confidential landings.
Average pounds landed were calculated as an arithmetic mean, using the sum of pounds landed and the count of distinct years, ignoring zero years.

4.0 SURVEY METHODS

4.1 TRAWL SURVEY

4.1.1 Survey Design

Sunrise Wind has contracted with scientists at the University of Massachusetts Dartmouth School for Marine Science and Technology (SMAST) and the Commercial Fisheries Research Foundation (CFRF) to execute a seasonal (i.e., four sampling events per year, approximately three months apart) trawl survey using an asymmetrical Before-After-Control-Impact (BACI) experimental design. The trawl survey at Sunrise Wind will be carried out synoptically with the trawl survey at the Revolution Wind Farm (RWF) lease area. Using the same survey vessel and scientific crew will improve the consistency of the monitoring and data collection between the two projects/lease areas. As discussed below, the same reference areas will be used for both lease sites.

The trawl survey will be conducted in collaboration with the F/V ***Gabrielle Elizabeth***. The otter trawl fishery is active within the Sunrise Wind lease area, and this gear type generates the greatest revenue within the Lease Area (Table 3). An otter trawl survey is an appropriate sampling gear for the Sunrise Wind Lease Area and the nearby control sites because this gear had broad selectivity and will effectively sample for multiple species, including groundfish (e.g., winter flounder, windowpane flounder, yellowtail flounder, Atlantic cod), monkfish, skates (e.g., winter and little skates), red hake, longfin squid, and others.

The primary objective of the pre-construction monitoring is to investigate the relative abundance (i.e., kilograms [kg]/tow) of fish and invertebrate resources in the SRWF Area ("SRW impact") and reference areas ("control") over time. The pre-construction trawl survey monitoring will also collect demographic information on fish and invertebrates including size structure, fish condition, diet, and reproductive status. The original target was to complete two years of sampling (i.e., eight seasonal trawl surveys) prior to the commencement of offshore construction, with the intention to begin sampling in the winter of 2021/2022. SMAST applied to NMFS for a Letter of Acknowledgement (LOA) to execute the survey, and the LOA was granted in November 2021. However, when the LOA was received, SMAST was informed that additional ESA and MMPA consultations were required prior to the start of any in-water activities. Therefore, the trawl survey has not yet commenced, as we are currently working with NMFS and BOEM to obtain an Incidental Take Permit for the trawl survey. SRW intends to begin the trawl survey as soon as practicable, once the Incidental Take Permit has been received. Sampling will continue during Project construction, and a minimum of two years of monitoring will be completed following offshore construction, with the duration of post-construction monitoring also informed by ongoing guidance for offshore wind monitoring that is being developed cooperatively through the Responsible Offshore Science Alliance (ROSA)[3].

The objectives associated with the trawl survey are as follows:

- **Objective 1**: Evaluate changes in the relative abundance of commercially important fish and invertebrate species between SRWF and the control areas pre-construction, during construction, and post-construction.

[3] ROSA Offshore Wind Project Monitoring Framework and Guidelines, March 2021

- **Objective 2**: Assess changes in the size structure of commercially important fish and invertebrate species between SRWF and the control areas pre-construction, during construction, and post-construction.
- **Objective 3**: Investigate changes in the composition of fish and invertebrate species between SRWF and the control areas pre-construction, during construction, and post-construction.
- **Objective 4:** Evaluate changes in the diet composition of black sea bass and summer flounder between SRWF and the control areas pre-construction, during construction, and post-construction.

The use of an asymmetrical BACI sampling design will allow for quantitative comparisons of relative abundance and demographics to be made before and after construction, and between the reference areas and SRWF area (Underwood 1992; Smith et al. 1993). Further, the replication of sampling across both time and space increases the ability to demonstrate that a change in abundance was caused by a human activity (Underwood 1992).

In order to maximize the utility of the monitoring, the trawl survey will utilize the sampling gear and protocols of the NEAMAP survey (Bonzek et al. 2008, 2017). The use of standardized survey methods will allow the data collected at SRWF, RWF, and the reference areas to be evaluated at multiple spatial scales (e.g., project specific scale and regional scale). NEAMAP trawl survey gear will also be employed within the Orsted Ocean Wind lease area off New Jersey, and South Fork Wind is also completing a trawl survey using a NEAMAP survey net along the South Fork Export Cable route in New York state waters. Further, to achieve consistency amongst developers, the survey methods and trawl net are consistent with the pre-construction data being collected by Vineyard Wind in their lease areas (He and Rillahan 2020). To maximize the regional comparability of the data that is collected, concerted efforts will be made to ensure that the timing of the SRWF trawl survey coincides with the NEFSC spring and fall bottom trawl surveys when the R/V Bigelow is operating in southern New England.

4.1.2 Sampling Stations

As mentioned above, the trawl surveys at SRWF and RWF will be executed simultaneously using the same vessel, sampling gear, and scientific crew, and catch rates at both the SRW and RWF impact areas will be compared to the same two reference areas. An examination of benthic habitat data, VMS data, and input from local fishermen indicated that a limited portion of the RWF lease area can be sampled safely and effectively using the NEAMAP trawl survey net. Therefore, the RWF Project area for the trawl survey was limited to the northern portion of the RWF lease area (Figure 3), which encompasses an area of approximately 125 km^2. The two reference areas proposed for the trawl survey (Figure 3) are also 125 km^2. The entire SRW lease area is approximately 445 km^2. In order to sample an equivalent amount of area (125 km^2) within the SRW impact site, it is proposed that the SRW trawl survey impact area be limited to the western portion of the lease site. This greatest concentration of effort by the large mesh otter trawl fleet occurred in this portion of the lease site from 2011 through 2016 (Figures A-1 and A-2).

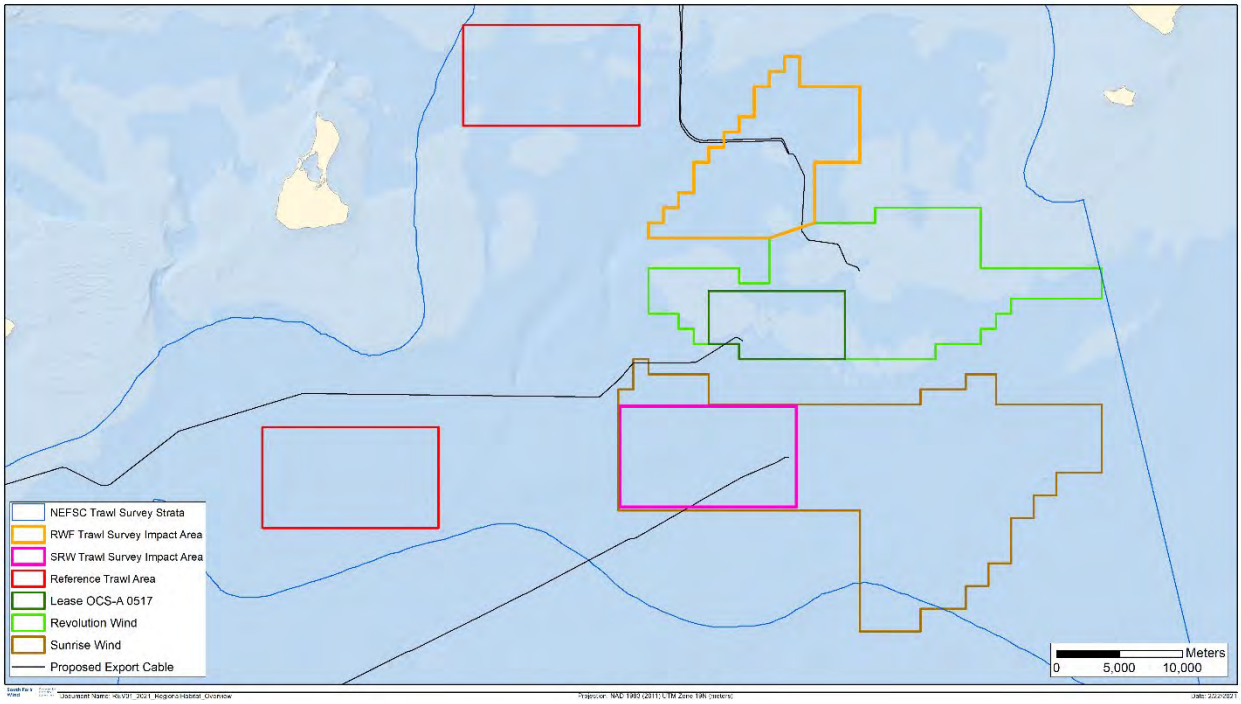

Figure 3. Location of the RWF lease site, the planned RWF Project area for the trawl survey (northern portion of RWF lease site, outlined in orange), the SRW lease site (outlined in brown), and the planned location of the impact area with SRW (outlined in pink). Also shown are the locations of the two planned reference areas (outlined in red).

The trawl survey will be executed using an asymmetrical BACI design, and trawl survey observations from the reference areas will serve as a regional indicator of relative abundance for fish and invertebrate species in an area outside of the direct influence of the Project and other offshore wind development. Two reference areas (Figure 3) were selected after considering several sources of information. Firstly, the locations of SRW and RWF were evaluated relative to the survey strata used on the NEFSC trawl survey. The NEFSC trawl survey is the only regional trawl survey with spatial coverage that overlaps these lease areas. The RWF lease area is located entirely within NEFSC trawl survey Stratum 1050 (Figure 4), and the SRW area is also located almost entirely within strata 1050. Stratum 1050 covers an area of approximately 5,213 km^2 and includes waters ranging from 27 to 55 m in depth (Politis et al. 2014). The entire SRW lease area is approximately 445 km^2. In an effort to maintain consistency with the stratification employed on the NEFSC survey, the reference areas were also sited within trawl survey 1050. Based on bathymetric data provided by the Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010), the depth within the SRW trawl survey Project area ranges from 41 to 54 m, and the mean depth is 49 m (Figure 5). The depth within the northern reference area ranges from 21 to 41 m (mean depth = 36 m), while depths in the southern reference area range from 41 to 55 m (mean depth = 50 m).

Survey Methods

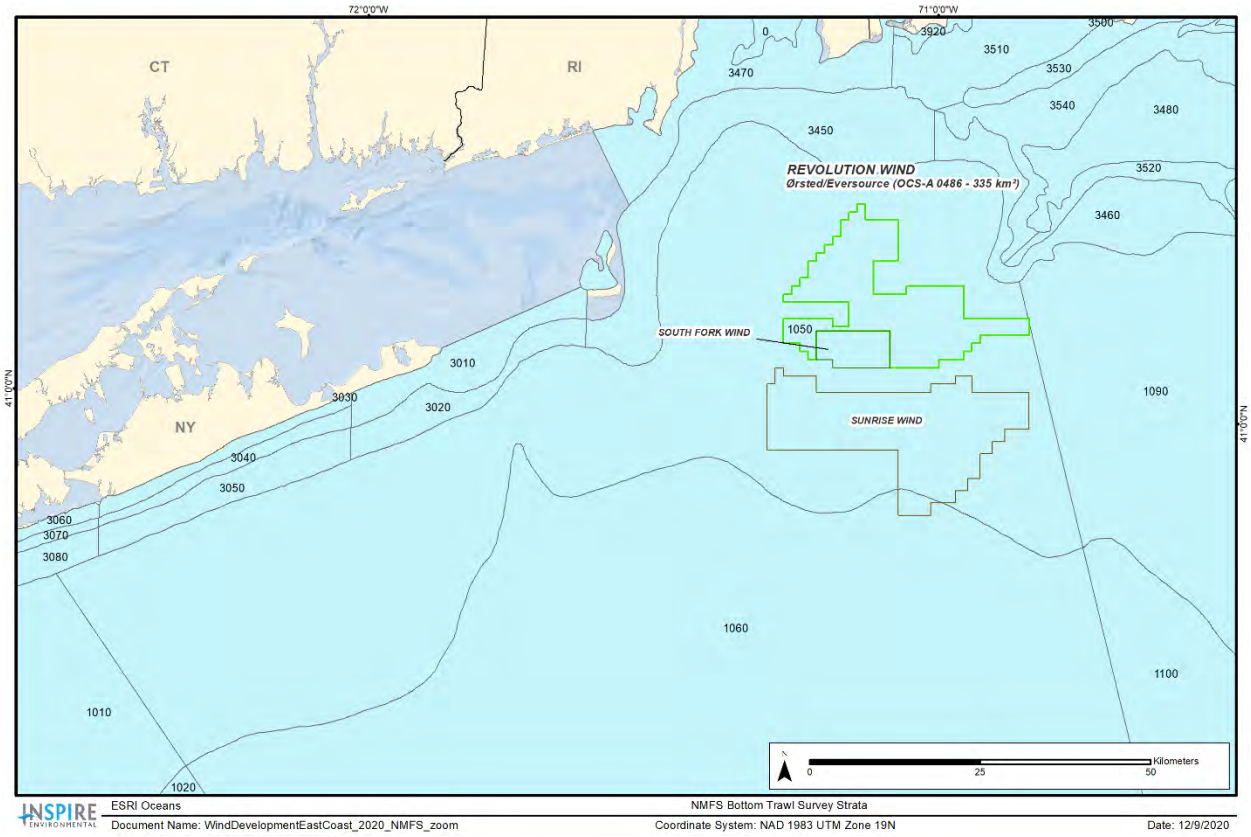

Figure 4. Location of the Revolution Wind, South Fork Wind, and Sunrise Wind lease sites relative to the survey strata used during the NEFSC bottom trawl survey. Nearly all of the Sunrise Wind Farm lease area is located within NEFSC survey Stratum 1050.

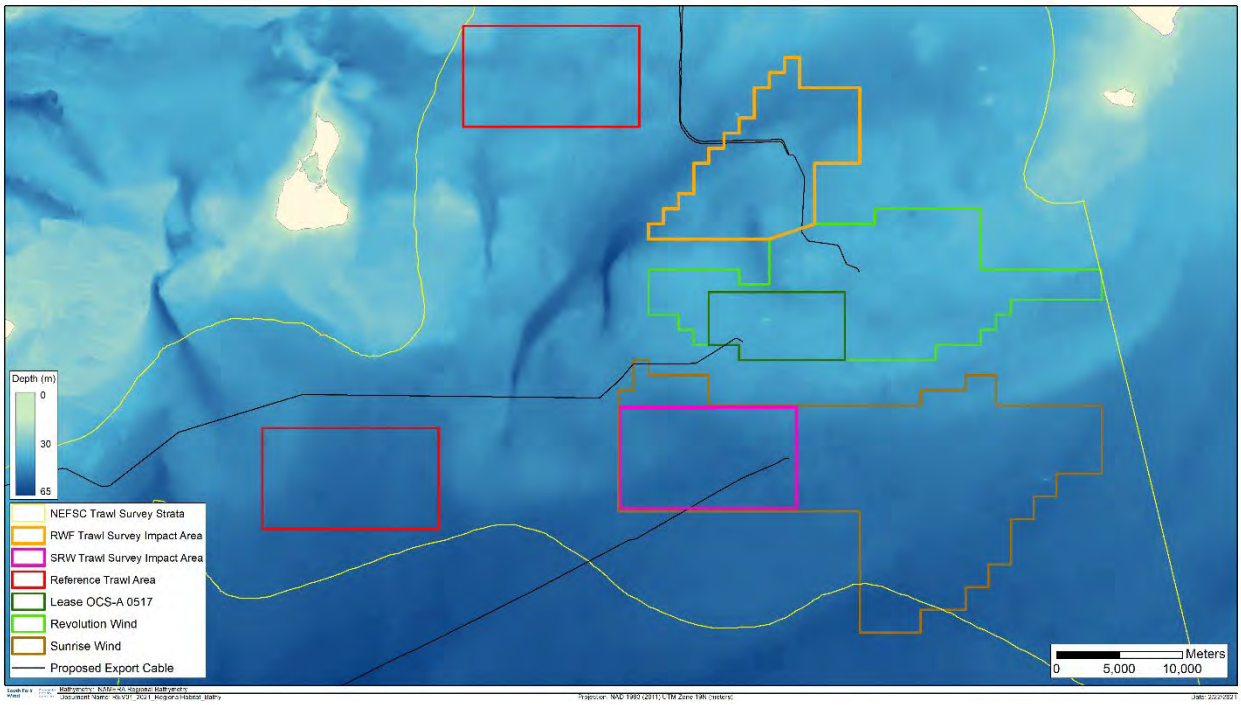

Figure 5. Bathymetric map of the SRWF and RWF lease areas and the planned reference areas for the trawl survey. Bathymetric data is shown in meters and was derived from the Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010).

Consideration was also given to the benthic habitat present at the SRWF, and reference areas were selected with similar benthic habitats as in the SRWF. Based on benthic habitat data provided from the Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010), the substrates within the planned footprint of the SRW trawl survey are diverse and include: moderate flat sand, shallow depression sand, moderate depression sand, moderate depression gravel, and moderate flat gravel (Figure 6). Further information on benthic habitats within SRW have also been collected through dedicated habitat mapping surveys (INSPIRE Environmental, in prep.) The benthic habitats within the northern reference area include shallow depression gravel, moderate flat gravel, moderate flat sand, high flat gravel, and high flat sand. The habitats within the southern reference area are slightly less diverse, and are primarily comprised of shallow depression sand, moderate flat sand, and moderate depression sand.

VMS data from the Mid-Atlantic Ocean Data Portal indicate that there were generally low to moderate levels of otter trawl activity by large vessels (i.e., >65 ft) from 2011 through 2016 (Appendix A, Figures A-1 and A-2), although there was relatively high trawling effort in the western portion of the Lease Area from 2011 through 2014 (Appendix A, Figure A-1). Similar levels of trawling activity were generally observed within the northern and southern reference areas (Figure 3).

Care was also taken to locate the reference areas in locations that are not currently known to be planned for future offshore wind development. Similarly, reference areas were not sited in locations that intersected with export cable routes. Modifications to the locations of the reference areas may be considered based on input received from the local fishing industry, following feedback received at agency meetings, or following discussion with the scientific contractor and/or fishermen that are selected to execute the trawl survey.

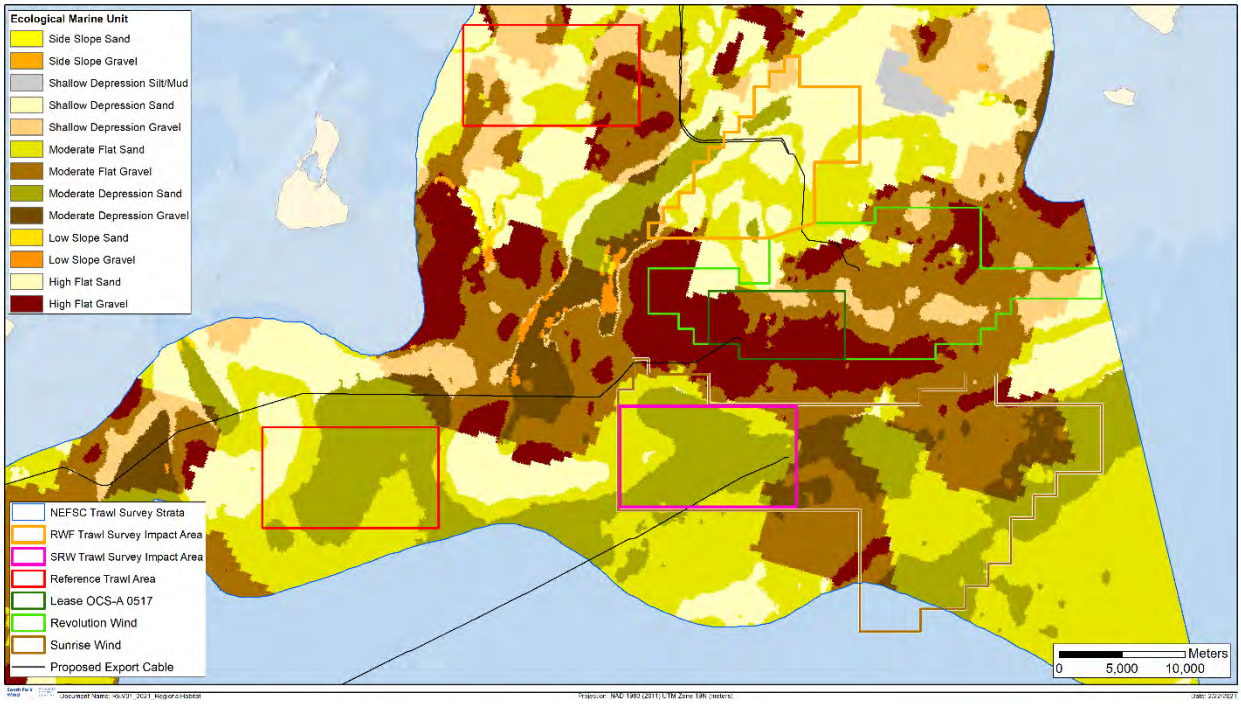

Figure 6. Benthic habitats within the RWF and SRW trawl survey study areas, and within the reference areas. Benthic habitat data was derived from the Northwest Atlantic Marine Ecoregional Assessment (Greene et al. 2010).

Consistent with the study design used by Vineyard Wind during their trawl survey (He and Rillahan 2020), a spatially balanced design will be used to assign random tow locations within the SRW trawl survey area and reference areas during each seasonal survey. The SRWF and reference areas will each be divided into 15 grid cells, and one randomly chosen location will be sampled within each grid cell during each seasonal trawl survey. The spatially balanced design will ensure that sampling effort is distributed throughout the SRWF and reference areas. Within the SRWF and the reference areas, the sampling density associated with each seasonal survey will be one station per 8.3 km^2. The order in which the reference areas and the SRWF trawl survey are conducted will be randomized prior to the start of each survey.

The location of trawl sampling stations may be subject to change due to the presence of fixed gear (e.g., lobster pots), or other factors that may preclude a randomly selected location from being sampled safely. Therefore, alternate sampling locations will be randomly chosen within each grid cell for each seasonal survey. If a primary sampling location is found to be untrawlable based on the captain's professional judgement, sampling will instead occur at one of the randomly selected alternate sampling locations. If any marine mammals are sighted in the vicinity of a trawl tow, sampling will be delayed at that location in order to minimize the risk of an interaction. Sunrise Wind will work with the scientific contractor(s) and captain and crew of the trawl vessel(s) to evaluate whether activities associated with cable installation (e.g., cable protection), or other construction activities, will impact the execution of the trawl survey after the wind farm is constructed.

A power analysis was conducted using trawl survey data from the Block Island Wind Farm (BIWF) and NEFSC trawl survey datasets (Appendix B). NEFSC trawl survey data from 2010 through 2018 were obtained from Phil Politis (Northeast Fisheries Science Center Bottom Trawl Program Lead, personal communication), and only tows from Stratum 1050 were used to inform the power analysis. From 2010 through 2018, the NEFSC trawl survey sampled in the spring and fall. Monthly catch data from the two reference sites sampled during the BIWF trawl survey were also reviewed to determine the extent to which the seasonal NEFSC trawl survey captured intraannual biomass peaks for different species of interest. Power analysis represents the relationships among the four variables involved in statistical inference: sample size (N), effect size, and type I (α) and type II (β) error rates (Cohen 1992). Of primary interest for this study is the interaction between temporal and spatial variables, specifically the contrast between the temporal change at the SRWF and the average temporal change at the reference sites (Equation 2 in Appendix B). Power curves were constructed to demonstrate how statistical power for the interaction contrast varies as a function of the variance in the catch data, the effect size (i.e., the percent change at the SRWF site relative to the reference sites), sample size (i.e., number of trawl tows per area in each season), and the number of reference sites that are sampled (Appendix B, Figures B-7 and B-8 in). When analyzing for changes in relative abundance, achieving a statistical power of at least 0.8 is intended, which is generally considered to be the minimum standard for scientific monitoring (Cohen 1992). This ensures that the monitoring will have a probability of at least 80% of detecting an effect of the stated size when it is actually present. A single alpha (0.10) was used for the power analysis, and the power analysis was completed assuming two years of pre-construction and post-construction monitoring will be completed.

A sample size of 15 trawl tows per area will be targeted per season in each year at the start of the survey. Based on the results of the power analysis (Appendix B, Figure B-7), this level of sampling is expected to have at least 80% power to detect a 33% temporal decrease for those species with Coefficient of Variations (CVs) ≤ 1.2, and approximately a 40% temporal decrease for species with CVs ≤ 2.0. Further, the use of an asymmetrical BACI design, with two rather than one reference areas, leads to gains in power for a given level of sampling intensity at the SRWF (Appendix B, Figure B-8). An examination of the NEFSC and BIWF trawl survey data indicates that most species exhibited moderate to high levels of interannual and intraannual (e.g., seasonal or monthly) variability in catch rates (Appendix B, Figures B-2 to B-6 and Table B-4). Given the magnitude of variability in catch rates that will likely be exhibited in the SRW trawl survey, it is not practicable to attempt to capture a small effect size (e.g., 25%) for fish and invertebrate species. This power analysis assumes that the variance in the catch rates during the SRW trawl survey will be similar to the variance observed during the BIWF and NEFSC trawl surveys. Following the first year (i.e., four seasonal sampling events) of trawl survey data the observed variability will be calculated for abundant species in the catch. The achievable effect sizes will also be identified following the first year of the survey, once the realized magnitude of variability is better understood, and once regional guidance regarding target effect sizes has been formalized through ROSA. Given the predicted power of the study design for the anticipated magnitude of variability (i.e., range of CVs from 0.8 to 2.0), the sample sizes proposed for the first year of the trawl survey are robust.

The proposed seasonal sampling intensity equates to an annual sampling target of 180 tows per year across the SRWF and reference areas. For comparative purposes, from 2010 through 2018, the NEFSC trawl survey completed four or five tows in Stratum 1050 during each spring and fall trawl survey (i.e., eight to ten tows per year).

4.1.3 Trawl Survey Methods

All survey activities will be subject to rules and regulations outlined under the Marine Mammal Protection and the Endangered Species Acts. Efforts will be taken to reduce marine mammal, sea turtle, and seabird injuries and mortalities caused by incidental interactions with fishing gear. For example, deploying trawl

gear will be delayed if marine mammals are sighted in the vicinity of the sampling station. All gear restrictions, closures, and other regulations set forth by take reduction plans (e.g., Harbor Porpoise Take Reduction Plan, Atlantic Large Take Whale Reduction Plan) will be adhered to as with typical scientific fishing operations to reduce the potential for interaction or injury.

The trawl survey will be carried out on a seasonal basis, with four surveys planned for each year. From 2010 through 2018 the NEFSC spring survey sampled in Stratum 1050 in March, April, and May, while the NEFSC fall trawl survey sampled Stratum 1050 in September and October. In order to achieve temporal overlap with the NEFSC trawl survey, the seasons for the SRW trawl survey will be defined as follows:

- 'Winter' survey months: December, January, and February
- 'Spring' survey months: March, April, and May
- 'Summer' survey months: June, July, and August
- 'Fall' survey months: September, October, and November.

To the extent practicable, concerted efforts will be made to ensure that the timing of the SRW trawl survey coincides with the NEFSC spring and fall bottom trawl surveys when the R/V Bigelow is operating in southern New England. Within a seasonal sampling event, the replicate tows within the SRWF and reference areas will be completed within as few days as possible, given practical constraints imposed by weather or other factors (e.g., mechanical issues with vessel). Efforts will also be made to have consistent timing between seasonal surveys (e.g., three months), to the extent possible.

The trawl survey will be executed using the trawl net that was designed by the Northeast Trawl Advisory Panel (NTAP) for the NEAMAP trawl survey. The NEAMAP survey net is a 400 x 12-cm three-bridle four-seam bottom trawl, and the net is paired with Thyboron, Type IV 168 cm (66 in) trawl doors (Bonzek et al. 2017). Several aspects of the net design make it an appropriate tool for sampling a wide range of species and size classes. The trawl is designed to achieve a relatively large vertical opening, and the use of a 'flat sweep' (i.e., 8-cm (3-in) cookie groundgear) allows that net to maintain close contact with the bottom and sample effectively for species that are closely associated with the benthos. A 2.5-cm (1-in) knotless cod end liner will be used to sample marine taxa across a broad range of size and age classes.

Net mensuration equipment will be used during the survey to provide the captain and scientific crew with real-time information on door spread, wing spread, and headrope height. This information also allows the area swept (km^2) to be calculated for each tow, which is needed in order to estimate absolute abundance. In order to promote consistency amongst samples, Orsted will work with the scientific contractor selected to execute the survey to establish a set of gear performance criteria to objectively compare the observed trawl geometry against the optimal geometry (e.g., Bonzek et al. 2017). The position, heading, and speed of the vessel will be monitored throughout each tow using a software program that is integrated with a GPS unit (e.g., NEFSC Fisheries Logbooks Data Recording System, or similar). A temperature logger attached to the trawl net will be used to record bottom temperature continuously (e.g., every 30 seconds) during trawling.

Similar to the methods employed on the NEAMAP survey and other regional surveys (e.g., MADMF biannual trawl survey), all tows will be completed during daylight hours, and the target tow duration will be 20 minutes. The tow will begin when the winches are locked and an acceptable net geometry is established. The relatively short tow duration is also expected to minimize the potential for interactions with protected species and marine mammals. A target tow speed range of 2.9 to 3.3 knots will be used. The amount of wire set with each trawl to achieve the target net geometry will be left to the professional judgement of the captain, dependent upon the depth and the in-situ conditions.

Survey Methods

Animals collected in each trawl sample will be sorted, identified to the species level, weighed, and enumerated consistent with the sampling approach of NEAMAP. Taxonomic guides that can be utilized to assist with species identification include ***NOAA's Guide to Some Trawl-Caught Marine Fishes*** (Flescher 1980), ***Bigelow and Schroeder's Fishes of the Gulf of Maine*** (Collette and Klein-MacPhee 2002), Kells and Carpenter's (2011) ***Field Guide to Coastal Fishes from Maine to Texas.*** Species will be identified consistently with the Integrated Taxonomy Information System (ITIS). The following information will be collected for each trawl that is sampled; catch per unit effort (CPUE), species diversity, and size structure of the catch. All species captured will be documented for each valid trawl sample. If any protected species are captured during trawling, the sampling and release of those animals will take priority over sampling the rest of the catch. When large catches occur, sub-sampling may be used to process the catch, at the discretion of the lead scientist. The three sub-sampling strategies that may be employed are adapted from the NEAMAP survey protocols and include straight subsampling by weight, mixed subsampling by weight, and discard by count sampling (Bonzek et al. 2008). The type of sub-sampling strategy that is employed will be dependent upon the volume and species diversity of the catch.

The biomass (weight, kg) of each species will be recorded on a motion-compensated marine scale that has been calibrated according to the manufacturer's specifications and used to calculate CPUE. Length will be recorded for the dominant species (i.e., most commonly encountered species), and priority species, in the catch. To assess the condition of individual organisms, up to 100 individuals of each species (and size class) will be measured (to the nearest cm) and weighed on a motion-compensated balance. Length (e.g., total length, fork length) will be recorded for each species consistent with the measurement type specified in the Northeast Observer Program Biological Sampling Guide. After sampling, all catch will be returned to the water as quickly as possible to minimize incidental mortality, aside from the summer flounder and black sea bass that will be sacrificed to stomach content analysis.

Biological samples will be collected for the commercial finfish species of primary interest in the reference and SRWF areas. In order to be consistent with the regional trawl surveys, a length-stratified design will be used to ensure samples are collected across all size and age classes for each species. The following list of priority species will be considered for biological sampling, but the list may be modified based on input from regional stakeholders and feedback from the scientific contractor(s) selected to perform this work; Atlantic cod, American lobster, black sea bass, summer flounder, winter flounder, Atlantic herring, monkfish, and yellowtail flounder. Biological sampling will include measuring the length and weight of individuals, and macroscopic evaluation of sex and maturity stage consistent with the sex and maturity classification used by the Northeast Fisheries Science Center (Burnett et al. 1989). Sex and maturity stage collected during the seasonal trawl surveys can be considered alongside of other fisheries independent data and used to inform the spatiotemporal distribution of spawning within the area, and the maturity data can also be considered when evaluating the relative condition of individual fish, as sex and maturity stage can influence relative condition (Galloway and Munkittrick 2006; Wuenschel et al. 2009). In addition, Sunrise Wind will purchase an additional 100 acoustic transmitters that can be used to opportunistically tag Atlantic cod captured during the trawl survey to support the ongoing BOEM-funded Atlantic cod spawning study that is occurring throughout the MA/RI WEA.

Survey Methods

Biological data for individual lobsters will be sampled consistently with the protocols used by the MADMF and RIDEM during their ventless trap surveys. Data collected for individual lobsters will include:

- Carapace length: Measured to the nearest millimeter (mm) using calipers.
- Sex: Determined by examining the first pair of swimmerets.
- Eggs: Examine the underside of the carapace for the presence or absence of eggs. The gross egg stage will be characterized according to the following categories:
    - Absent
    - Brown (partially developed with eyespot present and will hatch in this calendar year)
    - Green (newly spawned with no eyespot present)
    - Green with eyes (small eyespot present, but will not hatch in this calendar year)
- V-notch status: present or absent (according to the LCMA2 [Lobster Conservation Management Area 2] definition)
- Cull status: Examine the claws for condition (claws missing, buds, or regenerated)
- Incidence of shell disease: Shell disease will be characterized according to four categories:
    - Absent
    - Light (1-10% of the shell)
    - Moderate (11-50%)
    - Heavy (> 50%).
    - Mortality: alive or dead

Following seven years of data collection during the Block Island Wind Farm trawl survey, INSPIRE Environmental (2021b) recommended that future diet composition studies concentrate sampling efforts on a small number of focal species with different trophic niches, rather than trying to characterize changes in prey composition for a wide range of species. Following that recommendation, stomach content analysis will be performed for two recreationally and commercially important species, black sea bass and summer flounder, to examine their prey composition and evaluate whether diet composition changes between the SRWF and reference areas prior to and after construction. An examination of catch rates from the NEFSC bottom trawl survey and the BIWF trawl survey (Appendix B) indicate that the catch rates of these species in the trawl survey are likely to be sufficient to allow for comprehensive sampling of diet composition. Due to their behavior and biological characteristics, better understanding whether the development of offshore wind affects the diet of these two species is of ecological importance, and of interest to fishermen and managers.

Both black sea bass and summer flounder were identified as potentially serving as “key assessment indicator species” to understand the ecological impacts associated with offshore wind development (MADMF 2018). Malek (2015) identified both summer flounder and black sea bass as indicator species that should be considered when assessing the potential impacts of offshore wind development. Black sea bass and summer flounder were also noted as priority research species by Petruny Parker et al. (2015) and the Northeast Regional Habitat Assessment Prioritization Working Group (NMFS 2015). In addition, Guida et al. (2017) identified black sea bass as a species that was vulnerable to construction within the MA/RI WEA. A recent modeling study (Friedland et al. 2021) that used 43 years of data from the NEFSC trawl survey found that black sea bass are highly dependent on habitats in the wind energy areas during

the spring and fall, while summer flounder are highly dependent on these habitats in the fall, making these species good candidates for further investigation related to their diet composition and feeding behavior.

Black sea bass are characterized as opportunistic benthic omnivores, which consume a range of food including crustaceans, mollusks, and fish (Bigelow and Schroeder 1953; Kendall 1977; Drohan et al. 2007). Black sea bass are strongly associated with structured habitats including rocky reefs, cobble and rock fields, mussel beds, and stone coral patches (Drohan et al. 2007), and monitoring results from BIWF demonstrated an increased abundance of black sea bass near the turbine foundations following construction (HDR 2019). This observation at BIWF has led some stakeholders to express consternation about the potential trophic interactions associated with local increases in black sea bass abundance, out of concern that black sea bass will consume juvenile lobsters within the wind farm site following construction.

Adult summer flounder have been characterized as opportunistic feeders that prey primarily on fish and invertebrates, with the following fish species often included in their diet; windowpane flounder, winter flounder, pipefish, menhaden, bay anchovy, red hake, silver hake, scup, Atlantic silverside, sand lance, bluefish, weakfish, and mummichogs (Packer et al. 1999, and references therein). Summer flounder have also been reported to feed on a variety of benthic invertebrates including small bivalve and gastropod mollusks, small crustaceans, marine worms, sand dollars, and squid (Packer et al. 1999, and references therein).

Up to 10 animals will be sacrificed for stomach content analyses from each trawl that is sampled, with no more than five individuals of either species sampled from a single trawl. The target sampling intensity is to analyze 200 samples per species, in each area, during the two-year pre-construction sampling period. Cumulative prey curves provide an estimate of how prey diversity increases as a function of sample size and can help determine the sampling levels needed to adequately characterize diet composition (Chipps and Garvey 2006). Cumulative prey curves were derived for summer flounder and black sea bass based on stomach content analysis performed during the BIWF trawl survey. For summer flounder, the prey curves were created by time period (baseline and operation) and area (BIWF impact and reference sites) combinations and demonstrate that approximately 40 samples were needed within each combination of time and area factors to characterize their prey composition (Figure 7), although not all prey curves approached the asymptote at the same rate. For black sea bass, stomach contents were only monitored during the final (i.e., post-construction) year of the trawl survey, but the prey curves suggest that approximately 40 samples should be sufficient to adequately characterize their diet in each area and time period (Figure 8). By focusing stomach sampling on summer flounder and black sea bass, it is anticipated that the SRWF trawl survey will collect hundreds of samples for each species in both the impact and reference areas across all the three phases of the project, allowing for a rigorous examination of changes in diet composition over time. Each fish sampled for stomach content analysis will be measured (to the nearest cm) and weighed (to the nearest gram) individually before the stomach is removed to permit assessment of relative condition. All prey items will be identified to the lowest possible identification level (LPIL), counted, and weighed. Following the first year of pre-construction monitoring, cumulative prey curves will be produced to evaluate whether the sampling intensity should be modified in subsequent years.

During outreach meetings with the Rhode Island Fishermen's Advisory Board, concerns were raised that the construction and operation of the Sunrise Wind Farm would lead to sub-lethal impacts on sea scallops, particularly with regards to meat quality. In response to this concern, Sunrise Wind will conduct meat quality sampling for scallops that are captured during the trawl survey. The meat quality sampling protocols will be consistent with the sampling that is being performed by CFRF during the South Fork Wind Farm beam trawl survey. During the trawl survey, meat quality and biological condition will be evaluated for a subset of scallops (up to 10 individuals per tow). Sunrise Wind also notes that researchers at CFRF

were recently awarded a grant through the scallop Research Set Aside program[4] to develop standardized protocols for assessing the biological condition of scallops. Therefore, we will collaborate with CFRF during the trawl survey to ensure that scallops are being sampled consistently with the protocols that are developed as a result of that project.

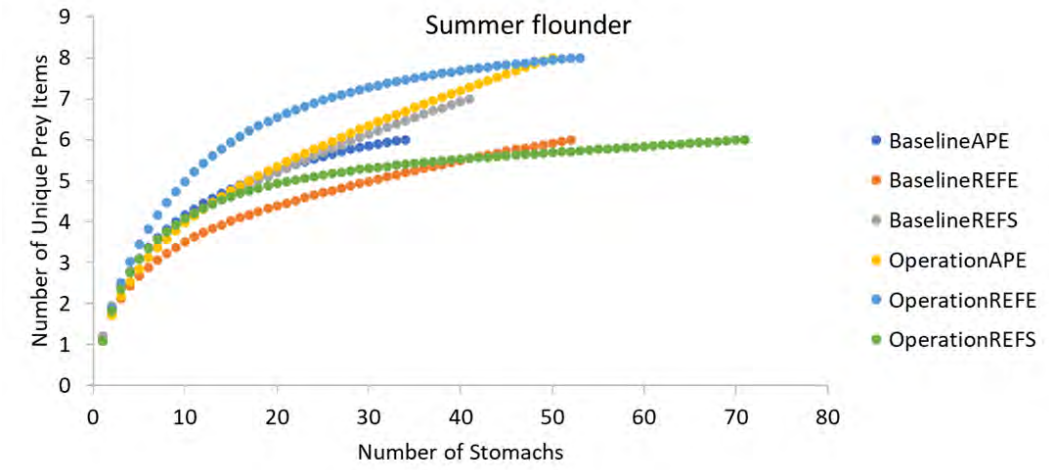

Figure 7. Cumulative prey curves for summer flounder observed during the BIWF trawl survey, in the impact area (APE) and reference areas (RFE and REFS) during the baseline and operation monitoring periods. Figure provided by INSPIRE Environmental (Wilber et al. in review).

[4] Sea Scallop Research Set-Aside Projects Selected for 2022–2023 | NOAA Fisheries

Survey Methods

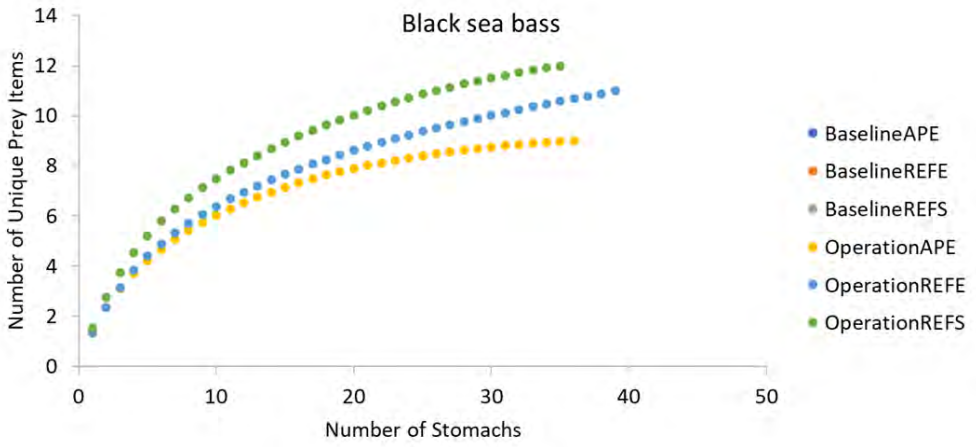

Figure 8. Cumulative prey curves for black sea bass observed during the BIWF trawl survey, in the impact area (APE) and reference areas (RFE and REFS) during the operation monitoring period. Figure provided by INSPIRE Environmental (Wilber et al. in review).

Hydrographic data will be collected at each trawl station. A Conductivity Temperature Depth (CTD) sensor (or similar) will be used to sample a vertical profile of the water column at each trawl station. The CTD profile may be obtained at the start or end of the tow, at the discretion of the chief scientist. Bottom water temperature will be recorded at regular intervals (e.g., every 30 seconds) throughout the duration of each tow either using a temperature logger mounted on the trawl net or using temperature sensors that are part of the net mensuration hardware.

Should any interactions with protected species (e.g., marine mammals, sea birds, sea turtles, sturgeon) occur, the contracted scientists will follow the sampling protocols described for the Northeast Fisheries Observer Program (NEFOP) in the Observer On-Deck Reference Guide (NEFSC 2016). If any protected species are captured during trawling, the sampling and release of those animals will take priority over sampling the rest of the catch. Reporting of interactions with marine mammals, such as small cetaceans and pinnipeds, will be dependent on the type of permit (i.e., EFP or LOA) issued to the project; once the permit type has been specified, Sunrise Wind will contact NMFS Protected Resources Division (NMFS-PRD) for guidance on reporting procedures. Additionally, protocols for handling live or deceased protected species of sea turtles, sturgeon, or marine mammals will be dependent on the type of permit (i.e., EFP or LOA) issued to the project. Once the permit type has been specified, Sunrise Wind will contact NMFS-PRD for guidance on handling protocols. Entangled large whales or interactions with sea turtle species will be reported immediately to NOAA's stranding hotline via telephone (866-755-NOAA) and interactions with sturgeon species will be reported immediately to NOAA via the incidental take reporting email (incidental.take@noaa.gov); a follow up detailed written report of the interaction (i.e., date, time, area, gear, species, and animal condition and activity) will be provided to the NMFS Greater Atlantic Regional Fisheries Office (incidental.take@noaa.gov) within 24 hours. Any biological data collected during sampling of protected species will be shared as part of the written report that is submitted to the NMFS Greater Atlantic Regional Fisheries Office, and any genetic samples obtained from sturgeon will be provided to the NMFS Greater Atlantic Regional Fisheries Office Protected Resources Division. Due to the potential for communicable diseases all physical sampling and handling of marine mammals and seabirds will be limited to the extent Orsted health and safety assessments and plans allow.

4.1.4 Trawl Station Data

The following data will be collected during each sampling effort:

- Station number
- Latitude and longitude at the start and end of the tow
- Time at the start and end of the tow
- Vessel speed and heading
- Water depth at the start and end of the tow
- Wind speed
- Wave height
- Weather conditions (e.g., cloud cover, precipitation)
- Tow speed
- Gear condition/performance code at the end of the tow
- Oceanographic data, as collected using a CTD and a temperature logger (see Section 4.1.3).

4.1.5 Data Management and Analysis

All field data will be reviewed for errors before being transcribed into a relational database. Quality control checks will be performed on database tables by running standardized, systematic queries to identify anomalous data values and input errors. Species names (common and scientific) will be verified and tabulated for consistency. All data used in analysis will be exported from the relational database.

Annual reports will be prepared after the conclusion of each year of sampling and shared with State and Federal resource agencies. Following the conclusion of the survey, one final report will also be produced synthesizing the findings of the pre- and post-construction evaluations. Sunrise Wind will also coordinate with their scientific Contractor(s) to disseminate the annual monitoring results through a webinar or an in-person meeting, and this meeting will also offer an open forum for federal, state, and academic scientists, as well as members of the local fishing industry, to ask questions or provide feedback on the data collection protocols.

The first two years of trawl surveys will provide additional fisheries-independent data to allow for characterization of the pre-construction fish and invertebrate community structure in both the SRWF and reference areas. For the pre-construction monitoring, the results presented in annual reports will focus on descriptive and quantitative comparisons of the fish and invertebrate communities in the SRWF and the reference areas to describe spatial, seasonal, and annual differences in relative abundance, species composition, frequency of occurrence for each species (e.g., presence/absence), and demographic information for individual fish such as length, weight, diet, and relative condition. For the dominant (i.e., most abundant) species in the catch, relative abundance will be compared amongst the reference and SRWF areas using descriptive statistics (e.g., mean, range) and length frequency data will be compared among areas using descriptive statistics, graphical techniques (empirical cumulative distribution function [ECDF] plots), and appropriate statistical tests (e.g., the Kolmogorov-Smirnoff test, cluster sampling). Species composition can be compared amongst the SRWF and reference areas using a Bray-Curtis Index and multivariate techniques (e.g., Analysis of Similarities [ANOSIM]).

Survey Methods

By continuing sampling during and after construction, the trawl survey will allow quantification of any detectable changes in relative abundance, demographics, or community structure associated with proposed operations. The BACI design for this survey plan allows the catch of numerically dominant species to be compared between the before and after construction periods in the two treatment types (reference and SRWF), using appropriate statistical modeling. The use of reference areas will ensure that broader regional changes in demersal fish and invertebrate community structure will be captured and delineated from potential impacts of the proposed Project. Analyses presented in the final synthesis report will focus on identifying changes in the fish community in the SRWF between pre-, during, and post-construction that did not also occur at the reference areas that could be attributed to either construction or operation of the wind turbines.

The primary research question to be addressed is what magnitude of difference in the temporal changes in relative abundance are observed between the reference and SRWF areas. This question will be addressed using point estimates and 90% confidence intervals (90CIs) contrasting the temporal changes between areas. This research question can also be framed using the following null and two-tailed alternative hypotheses:

- $H_{\emptyset}$ - Changes in relative abundance (CPUE) between time periods (before and after) will be statistically indistinguishable between the reference and SRWF areas.
- H_1 - Changes in CPUE between time periods (before and after) will be statistically different between the reference and SRWF areas.

In this design, there are multiple years within each time period and multiple sites within the Control treatment. Area will represent a fixed factor in the model with three levels (i.e., SRWF impact area, and two reference areas), which will be crossed with year, also a fixed factor. Environmental covariates (e.g., temperature, depth, and salinity) can also be included in the abundance model, either as linear or quadratic factors. The data logger attached to the trawl net will be used to record bottom temperature continuously during each tow, and the mean temperature for each tow can be included in the relative abundance model. The salinity at each tow will be informed by the CTD deployment, and depth will be calculated based on the average depth recorded at the start and end of the tow. The benthic habitat data provided by Greene et al. (2010) will be used to classify the dominant habitat present in each grid cell, allowing benthic habitat to be treated as a random effect within the model. Model selection will be conducted using Akaike Information Criteria (AIC) and residual diagnostics, and forward and backward stepwise elimination will be used to select the most parsimonious model (Venable and Ripley 2002).

This asymmetrical BACI design is not suited to analysis with a simple two-factor Analysis of Variance (ANOVA) model; instead generalized linear models (GLMs) or generalized additive models (GAMs) will be used to describe the data and estimate the 90% CI on the BACI contrast. The interaction contrast that will be tested is the difference between the temporal change (i.e., average over the post-operation period minus the average over the pre-operation period) at the SRWF and the average temporal change at the reference areas. A statistically significant impact would be indicated by a 90% CI for the estimated interaction contrast that excludes zero changes. A 90% CI is proposed to increase the power of the tests, i.e., increase the probability of identifying a significant impact of wind farm operation. This approach provides 90% confidence in the two-tailed hypothesis of “no difference”, and 95% confidence in each of the one-tailed hypotheses (i.e., change at the reference areas is less than at the SRWF, and change at the reference areas is greater than at the SRWF).

If desired, absolute abundances estimates can be derived for commonly sampled species. Estimation of absolute abundance will require assumptions regarding the efficiency of the survey gear and the availability of species to the trawl. Data on tow speed and tow duration collected by the chief scientist can

be combined with the trawl geometry data collected using the net mensuration sensors to estimate the area swept during each tow.

Length frequency data will be analyzed for the dominant species in the catch. The first question to be addressed is how the size structure of these species change over time (before vs. after construction). The second question to be addressed is how the size structure of these species varies between areas (SRWF vs. reference areas). To answer both questions, length frequency data will be compared between times and locations for common species using descriptive statistics (e.g., range, mean) and graphical and statistical comparisons using ECDFs, a Kolmogorov-Smirnov test (Sokal and Rohlf 2001), or another appropriate method such as cluster sampling (Nelson 2014) based on the characteristics of the data.

A secondary objective associated with the trawl survey is to evaluate fish condition. For priority species that are subject to detailed biological sampling, fish condition will be compared between areas, and across time, to examine whether fish condition is influenced by the construction and operation of the Project. For commonly sampled species, condition indices (Jakob et al. 1996) will be calculated for individual fish as its residual from the log10-log10 regressions of mass (kg) to length (cm). For each species the fish condition data will be fit with a GAM or GLM that best describes the data, and the 90% CI will be estimated for the relevant spatial and temporal contrasts. Given the migratory nature of many of the species that will be investigated, and the uncertainty of where these species have foraged, a change in fish condition may not necessarily be considered as an impact attributable to the construction and operation of the wind farm. However, this information can be evaluated to consider whether fish condition (a proxy for fish health) changes over time and between areas after the wind farm is constructed.

Another secondary objective associated with the monitoring is to evaluate species composition, which will be compared between areas and time periods to examine whether the construction and operation of the wind farm led to changes in the species composition within the SRWF. This research question can be examined using the following null and two-tailed hypotheses:

- $H_{ø}$ - Changes in species composition between time periods (before and after) will be statistically indistinguishable between the reference and SRWF areas.
- H_1 - Changes in species composition between time periods (before and after) will be statistically different between the reference and SRWF areas.

Species composition will be compared before and after construction using techniques such as calculating a Bray-Curtis Index or performing multivariate analyses (e.g., Permutational ANOVA [PERMANOVA], ANOSIM). Additional data analyses will be performed as appropriate based on the nature of the data that is collected (i.e., models will be fit to the data using appropriate error distribution).

Another secondary objective is to investigate diet composition for commercially and recreationally important species in the region. For diet data, the primary question that will be asked is whether the prey composition of black sea bass or summer flounder changes following the construction of the wind farm. This research question can be addressed for each species using the following null and two-tailed hypotheses:

- $H_{ø}$ - Changes in prey composition between time periods (before and after) will be statistically indistinguishable between the reference and SRWF areas.
- H_1 - Changes in prey composition between time periods (before and after) will be statistically different between the reference and SRWF areas.

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Seasonal diet data for focal species will be obtained from stomach contents, and prey composition will be calculated separately for each species as the mean proportional contribution (Wk) of each prey item (Buckel et al. 1999; Bonzek et al. 2008) by season and area, where:

$$\%W_k = \frac{\sum_{i=1}^{n} M_i q_{ik}}{\sum_{i=1}^{n} M_i} * 100$$

$$q_{ik} = \frac{w_{ik}}{w_i},$$

and where

n is the total number of trawl tows that collected the fish species of interest,

M_i is the sample size (counts) of that predator species in trawl sample ***i***,

w_i is the total weight of all prey items in the stomachs of all fish analyzed from trawl sample ***i***, and

w_{ik} is the total weight of prey type ***k*** in these stomachs.

Potential seasonal differences in prey composition will be explored for each focal species using multivariate techniques (e.g., PERMANOVA, Non-metric Multidimensional Scaling [nMDS], ANOSIM, and Similarity Percentages [SIMPER]). A stomach fullness index (FI) will be calculated for each fish analyzed. The difference between full and empty stomach weights will be determined to obtain the total weight of food (FW). The ingested food weight (FW) is expressed as a percentage of the total fish weight according to a formula defined by Hureau (1969) as cited by Ouakka et al. 2017.

FI = FW / fish weight x 100

Following the first complete year of trawl sampling (e.g., completion of four seasonal sampling events), cumulative prey curves (Chipps and Garvey 2006) will be used to assess the adequacy of the sampling for diet data. For each species, the cumulative number of prey types will be plotted against the number of stomachs examined. The point at which the curves reach the asymptote can be used to estimate the minimum number of stomachs that are needed to adequately characterize the prey composition (Chipps and Garvey 2006), and, if necessary, this information can be used to refine sample sizes in subsequent years.

Beyond the analyses described above, additional analyses will focus on evaluating the comparability of the SRWF trawl survey data with observations from other trawl surveys in the region, including the NEFSC and NEAMAP trawl surveys, as well as observations from trawl surveys completed at other lease sites (e.g., Vineyard Wind trawl survey). They use of the NEAMAP sampling protocols and trawl net will help facilitate these comparisons, which will provide valuable regional context to further evaluate whether the results observed at the wind farm are due to offshore wind development, or whether they are indicative of broader regional trends. These comparisons can be made at a variety of scales (e.g., lease site, NEFSC sampling strata, or stock area) as appropriate for the species and biological index of interest. The

additional analyses may include an evaluation of several indices, including relative abundance, fish condition, and size structure.

An adaptive sampling strategy will be employed, whereby data collected early in the study will be analyzed to assess statistical power and modify the sampling scheme or sampling intensity as needed (Field et al. 2007). Upon completion of the first four seasonal surveys, the power analysis will be updated to evaluate the power of the sampling design. A measure of variability associated with the relative abundance estimates for the dominant species in the catch will be calculated and the ***a priori*** power analysis (i.e., Appendix B) will be updated with these estimates. Power curves will be used to demonstrate how statistical power varies as a function of effect size and sample size (i.e., number of trawl samples per area). When analyzing changes in the relative abundance of dominant species in the catch, attaining a statistical power of at least 0.8 is intended to ensure that the monitoring will have a probability of at least 80% of detecting an effect of the stated size when it is actually present. A two-tailed alpha of 0.10 will be evaluated during the power analysis. There is a direct relationship between the magnitude of the effect size and the statistical power of the analysis, with greater power associated with larger effect sizes. The results of the power analysis will be considered and can be used to modify the monitoring protocols in subsequent years. The decision to modify sampling will be made after evaluating several criteria including the amount of variability in the data, the statistical power associated with the study design, and the practical implications of modifying the monitoring protocols.

4.2 ACOUSTIC TELEMETRY – HIGHLY MIGRATORY SPECIES

4.2.1 Background

Passive acoustic telemetry can monitor animal presence and movements across a range of spatial and temporal scales. For instance, each acoustic receiver provides information on the presence of tagged individuals on the scale of tens to hundreds of meters. Acoustic receivers also offer continuous monitoring, allowing for behavior, movements, and residence of tagged individuals to be investigated at a fine temporal scale (e.g., minutes to hours) and in relation to cyclical events (e.g., day/night, tide, etc.). By leveraging observations collected across individual receivers, and more broadly across receiver arrays, telemetry can also monitor animal presence and movement over a range of spatial scales (tens to hundreds of kilometers) and time scales (e.g., months to years). Therefore, passive acoustic telemetry is an ideal technology to monitor presence, residency, and movements of species within WEAs and to evaluate short and long-term impacts of wind energy projects on these movement parameters.

The use of passive acoustic telemetry has grown dramatically over the past decade and continues to grow each year (Hussey et al. 2015; Freiss et al. 2021). As a result of this rapid growth, hundreds to thousands of acoustic receivers are deployed each year in the northwest Atlantic from the Gulf of St. Lawrence to the Gulf of Mexico, each of which is capable of detecting the thousands of active transmitters that are currently deployed on at least 40 species including, among many others, sturgeon, striped bass, sea turtles, sharks, bluefin tuna, and black sea bass.

Acoustic telemetry has been used to investigate the behavior and movements of fish species in offshore wind areas. Reubens et al. (2013a) monitored juvenile cod residency patterns, habitat use, and seasonal movement at the C-Power offshore wind farm in the North Sea and found that the majority of cod aggregated near the foundations and were resident within the wind farm for extended periods of time in the summer and autumn. Winter et al. (2010) tagged sole (n=40) and cod (n=47) with acoustic transmitters and tracked their movements within the Egmond aan Zee wind farm and a nearby reference area and concluded that sole did not exhibit avoidance of the wind farm, nor did they appear to be attracted to the foundations. Instead, seasonal movements were interpreted as occurring at spatial scales larger than the wind farm. Karama et al. (2020) monitored tagged Japanese yellowtail (a highly mobile species) and red sea bream around an offshore wind turbine near the Goto Islands (Japan) over the course of a year and found that both species exhibited low affinity and residency around the turbine throughout all seasons. Acoustic telemetry has also been used to evaluate the interactions of marine organisms with power transmission cables. Klimley et al. (2017) monitored the movements of green sturgeon and salmon smolts in relation to the Trans Bay Cable within the San Francisco Estuary and concluded that the Cable did not impact the migration success of either species. Similarly, Westerberg and Lagenfelt (2008) studied the movements of European eels in the Baltic Sea around an AC power cable and observed that the swimming speed of the eels was reduced near the cable, but that the cable did not act as an impediment to migration.

Recently, BOEM has funded several studies to collect baseline data using acoustic telemetry for species such as sturgeon, striped bass, and winter skate, as well to investigate the seasonal movements and spawning behavior of cod within the MA/RI WEAs. The BOEM funded Atlantic cod telemetry project commenced in 2019 and is being conducted by a group of researchers from the Massachusetts Division of Marine Fisheries, University of Massachusetts Dartmouth School for Marine Science and Technology, NOAA, the Woods Hole Oceanographic Institution, and the Nature Conservancy. Ten acoustic receivers were deployed to monitor cod in the MA/RI WEA (Figure 9), and cod tagging is ongoing, with the goal of deploying acoustic transmitters on 100 cod in spawning condition. Atlantic cod has been recognized as a priority species for offshore wind monitoring by several groups (e.g., NMFS 2015; Petruny Parker et al.

2015; MADMF 2018), and cod have been identified as a species that is vulnerable to disturbance from the construction and operation of offshore wind farms (Guida et al. 2017).

Another acoustic telemetry project is also ongoing within the MA/RI WEA. In 2020, INSPIRE Environmental and the Anderson Cabot Center for Ocean Life (ACCOL) at the New England Aquarium received funding through the Massachusetts Clean Energy Center (MassCEC) to use acoustic telemetry to monitor the presence and persistence of Highly Migratory Species (HMS) at popular recreational fishing grounds within the MA/RI WEA. Thirteen acoustic receivers were deployed in July 2020 at three popular recreational fishing sites within the MA/RI WEAs identified through a previous recreational fishing survey carried out by the ACCOL (Kneebone and Capizzano 2020; Figure 9). These receivers were deployed strategically and in conjunction with the Atlantic cod receiver array, to maximize spatial coverage for both projects. The project is focusing on monitoring bluefin tuna, shortfin mako sharks, and blue sharks, which are three of the most commonly captured and targeted species by the offshore recreational community in southern New England (NOAA 2019) and were identified as priority species for monitoring the potential impacts of offshore wind in the MA/RI WEA (MADMF 2018). Shortfin mako sharks and tuna were also identified by Petruny Parker et al. (2015) as priority species for monitoring, and EFH is present within the study area for all three of the HMS. For-hire tagging trips using local charter vessels were conducted in 2020 and have continued in 2021 to target and tag 20 individuals of each of the three HMS species listed above (60 tags in total).

This acoustic telemetry monitoring effort will build off of these baseline studies by including five additional years of data collection, an expansion of the receiver array, and the deployment of an additional 150 acoustic transmitters for HMS. The project will be overseen by ACCOL at the New England Aquarium, with Dr. Jeff Kneebone serving as the Principal Investigator. ACCOL will partner with INSPIRE Environmental to execute the field work, data analysis, and reporting.

The primary objectives associated with the acoustic telemetry monitoring are as follows:

- **Objective 1**: Evaluate changes in HMS presence, residency, and movements between pre-construction, construction, and post-construction.
- **Objective 2**: Evaluate HMS connectivity among Orsted/Eversource lease sites.
- **Objective 3**: Monitor tagged HMS at spatial scales greater than the Orsted/Eversource Project areas.

4.2.2 Acoustic Telemetry Methods

Orsted, through the South Fork Wind (SFW) project, has already provided financial support to the ongoing cod and HMS acoustic telemetry studies. SFW provided funds to the cod telemetry project team to purchase six additional VR2W receivers, which permitted the deployment of their full receiver array after some receivers were lost early in the project. SFW also purchased mooring equipment (e.g., line, buoys, anchors, etc.) to retrofit the receiver moorings for the cod telemetry study to help minimize the loss of receivers and allow the project to meet its monitoring objectives. SFW also provided financial support to the HMS telemetry project to purchase, deploy, and maintain four VR2-AR receivers year-round, with the intention of improving the resolution of the broader MA/RI WEA acoustic receiver array, particularly during the cod spawning season. As part of the Orsted Ecosystem and Passive Acoustic Monitoring (ECO-PAM)

project[5], an acoustic receiver was deployed near SFW (41.06N, 70.83W) in July 2020, and that receiver is maintained by Mark Baumgartner at Woods Hole Oceanographic Institute.

The current HMS receiver array will be expanded from 17 to 32 receivers starting in May or June of 2022 and will achieve monitoring across the Orsted/Eversource lease sites (Sunrise Wind, Revolution Wind, and South Fork Wind) within the MA/RI WEA (Figure 9). The array will be comprised of 13 Vemco VR2-AR (acoustic release) receivers that were purchased through the INSPIRE Environmental/ACCOL MassCEC project, and 19 additional VR2-AR receivers that will be purchased by Orsted specifically for this monitoring activity. The full receiver array will be maintained year-round continuously through at least 2026. This will permit monitoring throughout the pre-construction, construction, and post-construction periods of the Sunrise Wind, Revolution Wind, and South Fork Wind projects. The receivers will also gather valuable pre-construction data at popular recreational fishing grounds within the OCS-A 0500 lease area. In addition, the HMS receiver array deployed during this monitoring study will continue to allow for detection of tagged cod, and all detections of tagged cod will be shared with that research team. The receivers will remain in the water year-round throughout the duration of the study to provide monitoring during the presumed cod spawning period of December through March (Cadrin et al. 2020; Dean et al. 2020).

Vemco model VR2-AR receivers will be rigged using standard procedures outlined by Vemco for benthic deployment[6]. Ropeless technology (AR Buoys) was selected to minimize risks to marine mammals and other protected species. VR2-ARs will be maintained using a Vemco VR-100 unit that communicates wirelessly to the receivers. The VR2-AR receivers are equipped with acoustic release mechanisms that allow instrument retrieval without the need for surface buoys and vertical lines in the water column. Ropeless technology (Acoustic Release Buoys) was selected to minimize risks to marine mammals and other protected species. The receivers will be deployed approximately two meters from the benthos, and two small floats keep the receiver oriented vertically in the water column to maximize the detection radius. Retrieval is performed with wireless communication from a VR100 aboard the vessel that triggers the release, using a push-off titanium pin and an attached floatation buoy to bring the released receiver to the surface. The receivers will be rigged inside a pop-up canister (Mooring Systems Inc) to enable to moorings to be retrieved during download trips, and to enable the moorings (75 pounds steel pyramid anchors) to be removed from the study site at the end of the monitoring.

Trips to download and maintain the acoustic receivers will be conducted in the spring and fall of each year of the project. During each trip, receivers will be summoned, downloaded, and cleaned of any biofouling. They will be re-rigged and re-deployed at sea. Receiver deployment and maintenance will be done primarily in collaboration with a local commercial fishing vessel.

[5] Orsted ECO-PAM (axds.co)
[6] https://www.vemco.com/wp-content/uploads/2015/01/vr2ar-deploy-tips.pdf

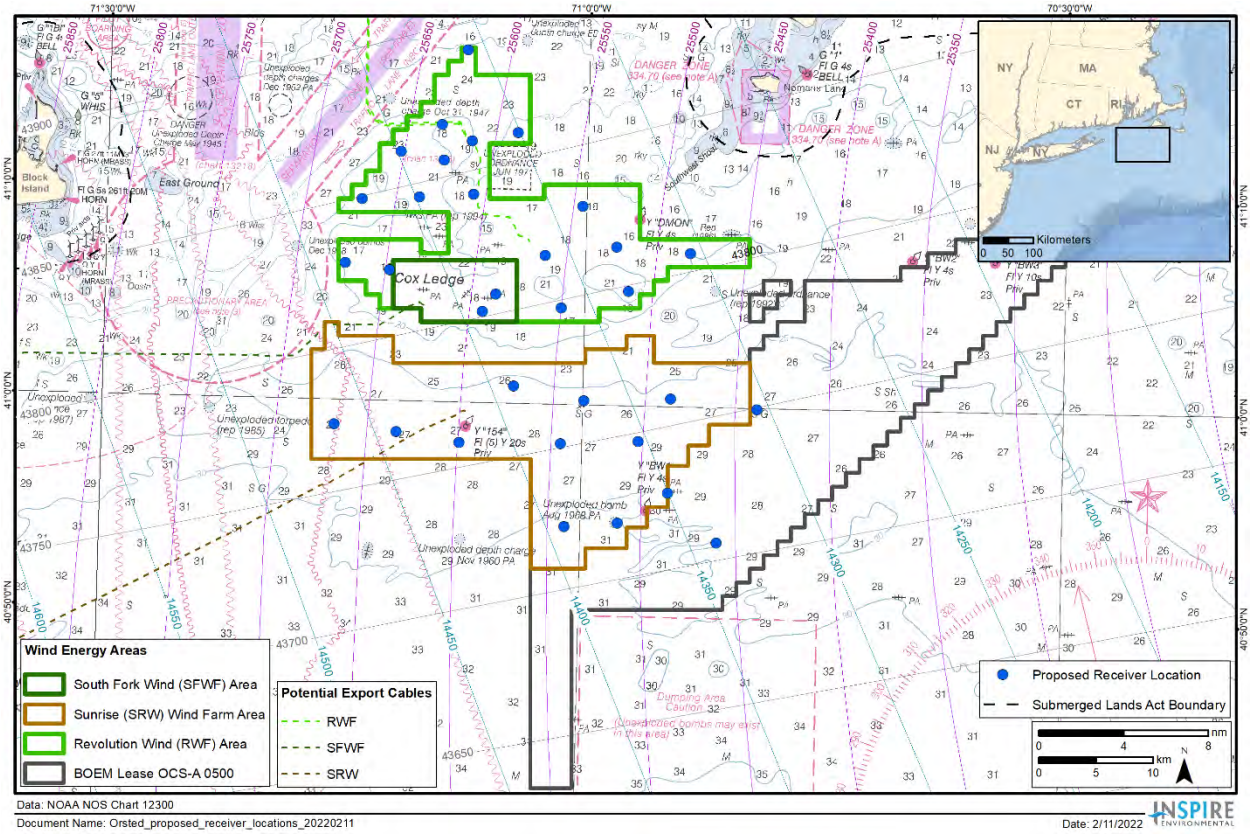


Figure 9. Proposed locations of acoustic receivers within Orsted/Eversource lease sites. The HMS receiver array will be expanded to 32 locations starting in 2022.

Acoustic receivers will monitor for the presence of the 60 Vemco V16 high power transmitters that were deployed on HMS as part of the 2020 – 2021 MassCEC project. An additional 150 transmitters will be deployed from 2023 – 2025 on HMS (target of 50 transmitter releases per year) as part of this monitoring plan. These transmitters will emit unique, coded signals every 60 – 120 seconds and have an estimated battery life ranging from 1000 – 2500 days, depending upon the specifications of the transmitters. Therefore, long-term monitoring of HMS will occur throughout and beyond the duration of the project. The VR2-AR receivers will also monitor and record water temperature and ambient noise every hour throughout the entirety of the study.

HMS will be tagged either internally or externally with acoustic transmitters, depending on the species and size of the animal. Bluefin tuna and smaller sharks will be tagged internally, and larger sharks will be tagged externally. External transmitters will be rigged on stainless, multi-strand cable and implanted into the dorsal musculature of the animal with a small titanium anchor. Internal transmitters will be implanted using standard surgical techniques outlined in the approved New England Aquarium Animal Care and Use Protocol.

The VR2-AR receivers will also opportunistically collect detection data from the thousands of marine organisms that are currently being tracked in the northwest Atlantic using acoustic transmitters including fish, invertebrates, sharks, sea turtles, and marine mammals. At present, the majority of acoustic receivers deployed in southern New England are located close to shore, often in estuaries and bays. Therefore,

establishing a robust, long-term acoustic receiver network in the offshore waters of the continental shelf will help fill spatial gaps in acoustic telemetry monitoring in southern New England, and provide valuable data to supplement the dozens of ongoing telemetry studies in the region.

4.2.3 Outreach for the HMS Acoustic Telemetry Study

Proactive outreach and engagement efforts have occurred to alert fishermen and regulatory agencies of the planned acoustic monitoring studies at SRW and other Orsted lease sites in southern New England, and several mitigating steps have been taken to minimize the likelihood of interactions between the acoustic receivers and mobile gear fishing effort. The proposed methods for the HMS telemetry study were presented to state and federal agencies starting in 2021, including meetings with staff at BOEM, NOAA, RIDEM, MADMF, MACZM, NYDPS, NYDOS, NYDEC, and RICRMC. The HMS acoustic telemetry study was also presented to fishing industry groups such as the NYSERDA Environmental-Technical Working Group and Fisheries-Technical Working Group, as well as the RICRMC Fishermen's Advisory Board and the Massachusetts Fisheries Working Group.

Beyond these formal meetings, the Orsted Marine Affairs team also conducted extensive outreach for both telemetry projects. That outreach started in the winter of 2022, and that outreach will continue prior to the deployment of the receiver arrays, and communication and outreach will throughout their deployment. Outreach thus far has included providing fishermen with nautical charts that included the proposed locations of acoustic receivers, and with fact sheets that provided information about the HMS telemetry study (see Appendix C). At the request of local fishermen, the proposed receiver locations were overlaid on nautical charts, to help them better understand the potential for interactions between the receiver arrays and their fishing effort. Sunrise Wind is also working with a local marine electronics company to upload GIS shapefiles of the proposed receiver locations to a USB drive, which the fishermen can plug into their wheelhouse computers to evaluate how the proposed receiver locations intersect with their fishing locations. Conversations with fishermen focused around understanding the potential for interactions between the acoustic receivers and fishing effort, particularly mobile gear fishing effort. Input from Orsted's Fisheries Liaisons and Fisheries Representatives were also used to identify areas of consistent mobile gear effort. The developers with lease sites in southern New England also hosted Joint Developers Port Hours in April 2022 in New Bedford, MA, Pt. Judith, RI, and Montauk, NY to gather feedback from fishermen on the proposed locations of the HMS receivers at the offshore lease sites, including Sunrise Wind.

Based on the feedback received to date, some of the HMS receiver locations that were originally proposed by the researchers have been revised to minimize the likelihood of gear interactions. The revised locations are depicted in Figure 9. For the HMS telemetry study, receiver locations were chosen in areas with hard bottom or 'hangs' wherever possible, in order to limit and potential interactions with mobile gear fishing effort. In addition, several of the proposed HMS receiver locations were moved to avoid areas with high densities of mobile gear fishing effort, particularly proposed receiver locations within the northeastern portion of the Revolution Wind lease area. We will continue to work with the research team at the New England Aquarium and Inspire Environmental to modify the receiver locations based on additional feedback that is received prior to the receivers being deployed in May or June of 2022.

Sunrise Wind has also developed a robust communication plan to ensure that the fishing industry is given advance notice of planned field activities. Orsted will issue a Mariners Briefing before any of the receivers are deployed, and the Mariners Briefing will be distributed electronically and posted on the Orsted

website[7]. The Orsted Marine Affairs team will also disseminate information about the timing and location of receiver deployments to the United States Coast Guard, who will then include this information in their Notice to Mariners Briefing. If there are significant changes to the receiver locations from what was disseminated to the fishing industry, Sunrise Wind will work with the Orsted Marine Affairs team to issue an updated Mariners Briefing as soon as possible. In addition, updated Mariners Briefings will be disseminated throughout the duration of the project if the receiver positions change from their original locations (e.g., following a download trip).

4.2.4 Data Management and Analysis

Scope of monitoring - Due to the highly mobile nature and anticipated large home range of HMS, monitoring will occur in aggregate over the Revolution Wind, Sunrise Wind, and South Fork Wind Project areas. Data aggregation will serve as a more biologically and ecologically appropriate manner to examine impacts on species that can use large areas of the southern New England region over variable periods of time (e.g., days to months). Accordingly, the data analyses described below will be performed, at a minimum, using all acoustic detection data collected by the 36 receivers deployed in the Revolution Wind, Sunrise Wind, and South Fork Wind Project areas. Finer-scale monitoring of HMS activity within each individual project area will be accomplished if sufficient data are available over the time series.

Additional data sources - Acoustic telemetry has recently been adopted as a multi-species monitoring platform throughout several MA/RI and MA offshore wind leases. Thus, monitoring opportunities under this plan will be bolstered and expanded through collaboration, cooperation, and data sharing with ongoing projects funded by other developers/entities. Efforts will be made to establish working relationships or formal agreements among various telemetry projects to maximize the amount of data that will be included in this monitoring plan. For example, detection data from acoustic transmitters that are deployed on HMS as part of non- Orsted/Eversource monitoring projects may be used in this monitoring plan contingent upon the establishment of a data sharing agreement with the entity that purchased the transmitter. Similarly, detection data for Orsted/Eversource transmitters that are logged by receivers deployed in other MA/RI or MA lease areas may be included in the analyses outlined in this monitoring plan. The potential for data sharing and cooperation across offshore wind projects will become more apparent over time as data sharing agreements are reached amongst developers. However, there is great potential to establish acoustic telemetry as a regional monitoring platform across numerous lease areas during the project period (2021 – 2026).

Reporting - Annual reports will be prepared after the conclusion of each year of telemetry monitoring and shared with state and federal resource agencies. Following the conclusion of the monitoring study, one final report will also be produced synthesizing the findings of the pre- and post-construction evaluations. Sunrise Wind will also coordinate with their research partners at the New England Aquarium and INSPIRE Environmental to disseminate the annual monitoring results through a webinar or an in-person meeting, and this meeting will also offer an open forum for federal, state, and academic scientists, as well as members of the local fishing industry, to ask questions or provide feedback on monitoring approach.

Data Analysis - The detection data will be compiled after each download and analyzed with the overall goal of establishing information on species presence and persistence across the Orsted/Eversource lease areas in the MA/RI WEA. Several metrics will be analyzed including short- and long-term presence, site

[7] Offshore Wind Farm Information for Mariners | Ørsted (orsted.com)

fidelity (i.e., residency/persistence), fine- and broad-scale movement patterns, and inter-annual presence (i.e., whether individuals return to the receiver array each year). Deliverables will include detailed detection history plots for each tagged individual that depict all detections logged for an animal by individual receivers, as well as by all receivers, over each year of monitoring. Summary tables and figures will be generated that describe: the total number of receivers an individual and/or species was detected on in the broader receiver array as well as in each project area, the number of times each fish was detected by each receiver, movements between individual receivers and project areas, and monthly/seasonal/annual patterns in presence and persistence in relation to environmental conditions (e.g., sea surface or bottom water temperature, photoperiod).

To examine animal home range, an estimation of individual and species' utilization distribution will be made using statistical analyses such as the Brownian Bridge Movement Model (e.g., Dean et al. 2014; Zemeckis et al. 2019) or a spatial point process model (Winton et al. 2018), both of which are effective when used with passive acoustic telemetry data. Connectivity and movements between receiver locations will be examined using a network analysis, which has been used previously to examine movements and space use with passive acoustic telemetry data (e.g., Lea et al. 2016). Analytical techniques for telemetry data are constantly evolving, therefore, using novel statistical methods to analyze data will be considered, such as state-space or multi-state models, should they become available during the course of the study. As appropriate, information on sea surface temperature, bottom water temperature (measured hourly by each receiver), season (or month), water depth, photoperiod, and substrate type will be integrated into all analyses to examine the influence of physical processes and environmental conditions on each metric.

The acoustic telemetry data can be evaluated across a range of spatial scales, depending on the scale of interest. To examine the factors that influence presence/absence of HMS at individual or groups of receivers, individual project areas, or the broader acoustic receiver array, a series of logistical regressions will be constructed. Regressions will test whether a series of fixed or mixed effects (e.g., water temperature, month, photoperiod, distance from construction location, distance from inter-array cable or export cable) influence the presence or absence of a species (the response variable). External data collected on ambient noise levels may be included in these regressions, as appropriate.

To examine potential effects of construction and operation on HMS, all analyses will be structured around the following objectives and hypotheses:

Objective 1: Evaluate changes in HMS presence, residency, and movements between pre-construction, construction, and operation.

HMS presence in southern New England has been documented to be driven by environmental (e.g., water temperature, photoperiod) or biological/physiological (e.g., ontogeny, thermal tolerance) factors. Thus, the presence, persistence, and movements of HMS in the Revolution Wind, Sunrise Wind, or South Fork Wind project lease areas likely varies naturally from month to month or year to year.

Accordingly, baseline and pre-construction levels for several standard metrics related to the presence/residency and movements for each species throughout the entire HMS receiver array including: minimum, maximum, and mean annual/seasonal residency times, presence in relation to environmental conditions (e.g., surface and bottom water temperature), nature of movement (e.g., long-term presence vs. transit/migratory corridor), and inter-annual patterns in presence/residency or movement (e.g., present in acoustic array annually, or sporadic, inconsistent presence over multiple years). These metrics will serve as the basis by which to examine the potential impacts of construction and operation of the Projects.

Survey Methods

To examine impacts of construction or operation, the aforementioned metrics will be created for each species during the construction and operations (if appropriate) phases of each project. For example, decreased residency times or the avoidance of an area that is otherwise biologically or environmentally-suitable for a species may be an indication of spatial displacement resulting from construction or operational activities. In contrast, more frequent detection (observation) or extended residency times of HMS in certain areas may be indicative of aggregation in response to the presence of fixed structures such as wind turbines.

H_0: HMS presence and movements are driven by environmental features (e.g., water temperature, prey distribution) and animal biology or physiology and are not affected by construction or operation of offshore wind projects.

H_1: HMS presence and movements are affected by construction or operation of offshore wind projects.

Objective 2: Evaluate HMS connectivity among Orsted/Eversource lease sites.

Given the differing construction timelines of the Revolution Wind, Sunrise Wind, and South Fork Wind projects, individual acoustic receivers will be monitoring locations that are at different stages of project development (e.g., pre-construction, construction, operation). To examine potential effects of construction or operation on HMS presence and movements in adjacent Orsted/Eversource lease sites/Project areas that are at an earlier stage of development, the metrics outlined in Objective 1 for all projects in a given phase will be calculated. For example, if construction has begun in South Fork Wind, the standard metrics for South Fork Wind will be compared to those of Revolution Wind and Sunrise Wind (which will still be in the pre-construction phase). If appropriate, the aforementioned logistic regression will be employed to test whether proximity to the construction site (e.g., linear distance away) impacts presence or avoidance for individual animals, or for species.

H_0: HMS presence and movements are driven by environmental features (e.g., water temperature, prey distribution) and animal biology or physiology and are not affected by construction or operation of offshore wind projects.

H_1: HMS presence and movements are affected by construction or operation of offshore wind projects.

Objective 3: Monitor tagged HMS at spatial scales greater than the Orsted/Eversource Project areas.

In addition to the local-scale acoustic monitoring achieved by the proposed HMS receiver array, regional or broad-scale movement data will be accomplished through data sharing with related HMS monitoring projects in other offshore wind lease areas, and through regional telemetry data sharing programs (e.g., Mid-Atlantic Acoustic Telemetry Observation System [MATOS], see Data Sharing section below). The first priority will be to establish data sharing agreements with other developers that will carry out acoustic telemetry monitoring for HMS at their lease sites. Sharing transmitter metadata and acoustic detection data across projects will permit 1) the monitoring of a larger number of HMS in the Orsted acoustic array, and 2) the monitoring of HMS tagged under this monitoring plan that are detected in adjacent receiver arrays in MA/RI or MA WEAs. Such data sharing will enable monitoring on a more regional level, which is more appropriate for highly mobile fishes, such as HMS, and this regional scale monitoring will help to elucidate cumulative impacts for these species. The statistical tests and analyses presented herein will be adjusted to incorporate all available data and adjust the spatial and temporal extent of this broader monitoring plan as appropriate.

Survey Methods

Participation in regional telemetry data sharing networks will provide detection data from tagged animals under this program wherever else they are detected in the greater Atlantic region. Any detection data obtained through Sunrise Wind's participation in regional telemetry data sharing networks will be incorporated into the analyses as appropriate, particularly to examine the distribution and movements of species beyond the confines of Orsted lease areas in southern New England. Information on the presence of tagged HMS beyond the receiver array in the Orsted Project areas will be particularly important to evaluate whether the lack of detection/observation of an individual (or species) is due to the avoidance of the area (i.e., presence in some other region) or tag loss or mortality (i.e., lack of detection of a tag over extended periods provides evidence of tag shedding or mortality). This analysis will also help to better understand connectivity between offshore wind development areas and adjacent habitats throughout the Northwest Atlantic.

Data sharing - All detection data from Atlantic cod that were tagged as part of the BOEM-funded telemetry study will be provided to the Principal Investigators of that study, and the data can be used to evaluate several metrics including site fidelity, residence times, and spatial distribution of cod throughout the Sunrise Wind, South Fork Wind, and Revolution Wind lease areas. The high-resolution data collected using acoustic telemetry can be utilized to improve the understanding of cod habitat use and spawning behavior in the region. The year-round deployment of the receiver array will improve monitoring during the winter cod spawning season, which is a time period that is not well sampled by the existing fishery independent surveys, and for which there is limited fishery-dependent data collected for the recreational fishery. Given that the cod transmitters being deployed by the BOEM-funded telemetry study have an expected battery life of 1400 days, cod detections should be recorded throughout the duration of this monitoring effort. Maintaining the receiver array over several years will provide valuable information of spawning site fidelity, interannual variability of habitat use, and the influence of offshore wind development on cod behavior.

All detection data for other species recorded by the acoustic receivers in this Project will be distributed to researchers through participation in regional telemetry networks such as the Ocean Tracking Network or MATOS. Any detection data that collected for transmitters that are not deployed as part of this HMS monitoring effort will be compiled and disseminated to the tag owners every six months (it is the policy of regional data sharing programs that the 'owner' of the data is the entity that purchased and deployed the transmitter, not the entity that detected it on their receiver). The research team will also approach each transmitter's owner to request the inclusion of their data (i.e., metadata on the species detected, number of detections, amount of time the animal was detected in the Orsted receiver array, etc.) in any analyses performed. Ultimately, participation in these large data sharing networks will increase both the spatial and temporal extent of monitoring for species tagged as part of this research effort and permit the collection of data on the presence and persistence of other marine species tagged with acoustic transmitters (e.g., Atlantic sturgeon, striped bass, white sharks) in and around Orsted lease sites at no additional cost. If a large amount of detection data is obtained for a given species over the course of monitoring, the research team will engage in conversations with the owner(s) of detected transmitters to explore the potential of adding those species to this monitoring plan. Thus, the choice to use acoustic telemetry in the Orsted monitoring framework provides the potential to expand the monitoring efforts described herein beyond HMS and Atlantic cod.

Due to the proven ability of acoustic telemetry to monitor a large number of animals over variable spatial and temporal extents, this technology has already been adopted in several wind energy-related projects along the US east coast. Given this, there is growing potential for coordination and data sharing across projects. However, in order to achieve efficient and successful coordination and data sharing, project leaders need to be aware of ongoing telemetry projects in the region and establish data sharing plans before or during the early stages of projects. Currently Orsted and other developers with lease sites in

southern New England are working to develop an inter-developer agreement related to acoustic telemetry data sharing and standards. Once it is finalized, this agreement will be disseminated to serve as a model for data sharing among offshore wind telemetry projects moving forward.

4.3 ACOUSTIC TELEMETRY – SUNRISE WIND EXPORT CABLE

4.3.1 Background

The Sunrise Wind Project will use one DC submarine export cable (SRWEC), within an up to 105-mi (169-km) corridor to transmit power to shore at Smith Point County Park in the Town of Brookhaven, New York. The DC magnetic field generated by the SRWEC will combine via vector addition with the Earth's geomagnetic field. In other words, the DC field from the SRWEC may affect both the magnitude and direction of the natural DC field in proximity to the cable. The cable will use materials such as grounded metallic sheaths and steel armoring, to shield the electric current from entering the marine environment (Snyder et al. 2019). However, the SRWEC will be a source of a static magnetic field that will modify the ambient static geomagnetic field. The movement of electric charges in a static magnetic field around the cable will produce a weak electric field. The strength of the magnetic field, and the induced electrical field, are dependent upon the amount of electrical current (Amperes) flowing through the cable.

Many fish species have evolved the ability to detect and respond to the Earth's magnetic field (i.e., magnetosensitivity), and fish and elasmobranchs are thought to use their magnetic sense in concert with their other senses to guide their migrations (Snyder et al. 2019). Based on modeling results, the magnetic fields generated by the DC cables on the overlying seabed at peak loading levels are projected to be well below the levels detectable by finfish, and slightly above detectable levels documented to elicit minor behavioral changes in crustaceans and elasmobranchs (Exponent 2021). Available field studies have shown these magnetic fields will not result in adverse population-level effects to elasmobranch species (Exponent 2021). The strength of the magnetic fields will diminish quickly with distance from the cable (Snyder et al. 2019), creating a detectable difference from Earth's natural geomagnetic field only within the immediate vicinity of the SRWEC (Exponent 2021). In addition, because the magnitude of the magnetic field varies as a function of distance from the cable, species that have close associations with benthic habitats will have the greatest exposure to electromagnetic fields (EMF) from the cable (Exponent 2021).

Evaluating the potential impacts of EMF from undersea power transmission cables has been one of the major research priorities identified by stakeholders (e.g., commercial and recreational fishermen) during the development of fisheries monitoring guidance related to offshore wind (ROSA 2021), and there have been calls to focus monitoring efforts related to specific stressors associated with the construction and operation of offshore wind farms, particularly EMF (Petruny-Parker at al. 2015; MADMF 2018). Stakeholders have expressed concerns that the SRWEC may affect the migratory behaviors of commercially and recreationally important species. In some cases, it has been suggested that offshore wind export cables might pose a barrier to migration by electrosensitive or magnetosensitive species, although there is no evidence to support this speculation (Snyder et al. 2019). Acoustic telemetry has been recognized as a suitable monitoring approach to assess the in-situ movements of lobsters, crabs, and elasmobranchs, and to evaluate whether EMF influences the movement ecology of marine organisms (Petruny-Parker et al. 2015). Prior acoustic telemetry studies (e.g., Kavet et al. 2016; Klimley et al. 2017) have demonstrated the utility of using acoustic telemetry to evaluate the behavioral responses of individual fish to EMF produced by bridges and undersea power cables.

In this study, an acoustic telemetry receiver network will be established along the route of the SRWEC, and dedicated telemetry tagging will occur to evaluate the potential impacts associated with the operation of the SRWEC on important marine species. The focal species for this study were chosen based on

several factors including their known sensitivity to EMF, their ecological significance or importance to regional commercial and recreational fisheries, and their geographic overlap with the SRWEC. Monitoring efforts will focus on species associated with the benthos, given that they will experience the greatest potential impacts from EMF (Snyder et al. 2019). The species selected for telemetry monitoring are; American lobsters, horseshoe crabs, winter skates, sandbar sharks, sand tiger sharks, dusky sharks, and smooth dogfish.

Elasmobranchs exhibit sensitivity to both electric and magnetic fields (Snyder et al. 2019), and studies have shown that they use the Earth's magnetic field to guide their migrations (Keller et al. 2021). Specialized sensory organs, ampullae of Lorenzini, allow elasmobranchs to sense electrical fields which are used to help locate predators, prey, and find mates. Prior research suggests that species which possess these specialized organs are considered the most likely to exhibit a behavioral reaction in response to undersea power cables associated with offshore wind projects (Snyder et al. 2019). Several species of elasmobranchs occur within the footprint of the SRWEC, with some species using the area seasonally, and others displaying more resident habitat use within the region. In particular, recent acoustic telemetry monitoring efforts have documented the seasonal presence of several elasmobranch species at the New York Department of Environmental Conservation (NYSDEC) Center Moriches Artificial Reef area which is in close proximity to the SRWEC route (Bradley Peterson, personal communication), including sandbar sharks, sand tiger sharks, dusky sharks, and smooth dogfish. These elasmobranchs feed on benthic fish and crustacean prey including flounder, goosefish, skates, rays, dogfish, and blue crabs. This benthic foraging behavior may expose them to potential magnetic fields associated with the cable.

In the past 25 years, regulations to protect certain elasmobranch species have been established in US waters. Due to their decreasing population trends, sandbar, dusky, and sand tiger sharks are federally prohibited species, and sand tiger sharks and dusky sharks have been listed as a 'species of concern.' To aid in the conservation of these species, NYSDEC prohibits commercial and recreational fishermen from retaining these three species. Since 2008, NOAA's Atlantic Highly Migratory Species Management Division has required that any sandbar shark caught in state or federal waters must be immediately released with minimum injury and without removing it from the water. This control appears to be easing some pressure on their populations in US waters. Sand tiger sharks in areas of the western Mediterranean, Europe, and eastern Australia are considered critically endangered due to the commercial fishery for their fins. Finally, stocks of the dusky sharks have been severely overfished off the eastern coast of the US. While commercial and recreational fishing for this species has been prohibited since 1998, the effectiveness of the ban has been limited due to the high bycatch mortality of dusky sharks on multi-species gear. These three species of elasmobranchs were selected as target species due to their protected status and bottom foraging behavior. Prior studies have demonstrated that sandbar sharks can detect, and in some cases will respond to, magnetic-field deviations (Nestler et al. 2010; Anderson 2018). Finally, smooth dogfish was selected as a target species due to its benthic foraging behavior and its importance as a commercially targeted species.

Winter skates, which support a valuable commercial fishery, have been recognized as a priority species for understanding the potential impacts associated with EMF, given their close association with the benthos, their sensitivity to both electric and magnetic fields, and their overlap in distribution with the wind energy areas (Petruny-Parker et al. 2015; MADMF 2018; Snyder et al. 2019). Recent field studies by Hutchinson et al. (2018, 2020a) have demonstrated that skates exposed to a DC cable exhibited behavioral changes compared to a control group, including modified swimming behavior and greater time spent near the sea floor.

Understanding the potential impacts of EMF on American lobster has been identified as a monitoring priority (Petruny Parker et al. 2015; MADMF 2018). Lobsters migrate seasonally through habitats along the

SRWEC route and have demonstrated changes in behavior when exposed to EMF from an HVDC power cable, although the cable did not act as a barrier to migration (Hutchinson et al. 2018, 2020a). Modeling results associated with the SRWEC estimated that the magnetic-field levels at the seabed immediately above the buried SRWEC calculated at peak loading are slightly higher than DC magnetic fields that caused minor changes in lobster behavior and distribution, indicating that large crustaceans will be able to detect the elevated magnetic field, but only when in close proximity to the cable during peak loading (Exponent 2021).

In addition to these target elasmobranchs, other ecologically or commercially important species have been detected at the NYSDEC Center Moriches Artificial Reef area two miles east of the SRWEC corridor including horseshoe crabs, Atlantic sturgeon, and striped bass. The south shore of Long Island is a critical habitat for horseshoe crab spawning with some of the highest abundances in areas including the benthos where the SRWEC will traverse (Sclafani et al. 2009). Since horseshoe crabs are a commercially important species harvested for bait and their blood which is used to detect the presence of bacterial contaminants in vaccines (including the Covid-19 vaccine), they will also be examined in this study. Horseshoe crabs have been listed as “Poor” status in New York State by the Atlantic States Marine Fisheries Commission (ASMFC 2019; Smith et al. 2017) and their declines in recent decades throughout the US East Coast resulted in them being listed as “Vulnerable” on the International Union for the Conservation of Nature (IUCN) Red List. Furthermore, they have also been listed as a priority species for assessment of effects of EMF from undersea power cables by BOEM (Normandeau et al. 2011) and hence they will also be examined in this study. Atlantic sturgeon are known to be sensitive to both electric and magnetic fields (Snyder et al. 2019; Exponent 2021), have a strong affinity to the benthos, and are a priority for monitoring due to their current population status which is considered as ‘threatened’ under the Endangered Species Act.

Sunrise Wind will work with researchers at Stony Brook University, Cornell Cooperative Extension, and the Shark Research and Education Program at the South Fork Natural History Museum to conduct a multi-year acoustic telemetry study to assess the potential impacts of the SRWEC on the behavior and migratory patterns of commercially and ecologically important species in coastal waters south of Long Island. The specific objectives associated with this monitoring study are as follows:

1. Implant or attach acoustic transmitters on lobsters, horseshoe crabs, winter skates, smooth dogfish, sandbar sharks, dusky sharks, and sand tiger sharks.

2. Deploy two arrays of acoustic receivers at the nearshore areas of the SRWEC landfall that extend outside of the existing receiver arrays deployed by Stony Brook University at Rockaway, Jones Beach, Fire Island, East Hampton, and Montauk, that are is designed to capture both broad-scale migratory behavior and fine-scale behaviors.

3. Evaluate effects of EMF on behavior and movement on targeted species before, during, and after construction.

4. Estimate movement metrics including depth, two-dimensional position, and residency for telemetered individuals.

5. Maintain the offshore and nearshore Sunrise Wind Receiver Arrays and collect data on the individuals tagged by Stony Brook University and partnering organizations along the east coast.

4.3.2 Acoustic Telemetry Methods

The study will commence in 2022, and continue through 2027, encompassing all three phases of cable installation (before, during, and after installation). The receiver array will be deployed in June or July of 2022, and dedicated tagging trips would commence shortly after the receiver array has been deployed.

Capture and tagging of study animals will occur from a variety of vessels and projects. The expertise of the South Fork Natural History Museum Shark Group will assist in capturing and tagging of elasmobranchs. In addition, if necessary, hook and line will be used from Stony Brook University vessels to capture elasmobranchs for tagging. The Principal Investigators will attain all required research and scientific collection permits prior to commencing the tagging efforts.

Long-term projects established between NYSDEC and Stony Brook University (SBU) provide an additional platform for tag deployment. The Nearshore Trawl Survey (NTS) and the Acoustic Gates (AG) projects provide regular opportunities to capture specimens in the coastal ocean and estuaries in the New York Bight. The NTS carries out five surveys per year along the coast of Long Island, New York, sampling 25 stations per cruise. The AG project deploys over 150 acoustic tags per year in estuarine and coastal waters along the south shore of New York.

Surgical procedures will follow approved Stony Brook University Institutional Animal Care and Use Committee approved protocols. Briefly, all elasmobranch individuals will be measured for total length to the nearest mm and placed in tonic immobility along the side of the boat before surgery. Transmitters will be surgically placed through an incision into the peritoneal cavity, then closed with two or three simple interrupted sutures. Individuals will be monitored after surgery, then released. Horseshoe crabs and lobsters will have the transmitters epoxied to their exoskeleton and released following the methods described in Brousseau et al. (2004).

Sandbar sharks, sand tiger sharks, dusky sharks, smooth dogfish and winter skates: A target sample size of 25 individuals per shark species will be implanted with acoustic transmitters with sensors for depth and temperature (V16TP; 69 kHz, high-power output = 158 dB re 1 µPa at 1 m, random transmitter delay = 120 s, life span = 2,435 d) in 2022. These tags transmit presence, temperature (with an accuracy of ± 0.5 °C), and depth (estimated via pressure with an accuracy of ± 1.5 m at a depth of 17 m) data as an acoustic receiver detects them. In addition, 25 winter skates will be implanted with acoustic tags without depth or temperature sensors (V16; 69 kHz, high-power output = 158 dB re 1 µPa at 1 m, random transmitter delay = 120 s, life span = 3,508 d). An additional 125 transmitters (target of 25 transmitters for each species) will be deployed annually in 2023, 2024, and 2025.

Horseshoe crabs and lobsters: A target sample size of up to 50 individuals of each species will be tagged with either a V13 (69 kHz, high-power output = 151 dB re 1 µPa at 1 m, random transmitter delay = 180 s life span = 648 d) or a V16 (69 kHz, 158 dB re 1 µPa at 1 m, random transmitter delay = 120 s, life span = 2,435 d) accelerometer transmitter. Tagging will commence in 2022, and a target of 50 transmitters will be deployed annually on each species in 2023, 2024, and 2025.

Atlantic sturgeon, and additional telemetered individuals: Detection data for sturgeon will be obtained from Stony Brook University's ongoing tagging efforts, including >300 telemetered sturgeon with active transmitters. In addition, a total of 223 elasmobranchs have been tagged by Stony Brook University since 2016 including the following: 45 sandbar sharks, 96 smooth dogfish, 39 spiny dogfish, 13 sand tiger sharks, and 30 winter skate. Provided that sufficient detections are recorded, these individuals will be included in analyses conducted for this monitoring effort, along with the explicitly deployed transmitters as part of this monitoring study.

Survey Methods

Positional monitoring of tagged individuals will be accomplished using two arrays of acoustic receivers to evaluate both broad-scale migratory behavior as well as fine-scale movements near the SRWEC (Figures 10 and 11). The offshore receiver array will include three linear gates of receivers (offshore north approach, offshore south approach, and SRWEC gate). The nearshore fine-scale positional array will be used to evaluate movement around the SRWEC with high spatial resolution. Temperature (mean, min, max) will be recorded every three hours on all VR2AR-X receivers providing information to evaluate environmental drivers of the presence/absence of telemetered individuals in the study area.

The offshore receiver array will provide the ability to track movement as telemetered individuals enter the approach field, pass over the cable area, and exit the approach region. The receiver array was designed to collect data that will provide for robust statistical analysis of the potential impacts of EMF on movement metrics. The north and south approach gates of receivers are designed to capture telemetered individual's movement toward the SRWEC prior to any potential exposure to introduced EMF, while the gate of receivers along the SRWEC provides coverage near the cable and the ability to capture any alterations to movement behavior due to exposure to EMF. The design provides a quasi-controlled field-experiment system where the approach gates provide movement and behavior metrics independent of potential EMF impacts, while the SRWEC gate is adjacent to the cable and can capture local changes in behavior. In the offshore receiver array each linear gate will include 10 VR2AR-X acoustic release omnidirectional hydrophones (receivers) that can detect a telemetered individual from a radius of 500 to 1000 m depending on sea conditions and transmitter strength (Figure 10). The receivers in the three linear gates will be placed approximately 1 km apart.

The near-shore fine-scale positioning array will provide high-resolution information on the two-dimensional or three-dimensional movements (depending on the type of transmitter) of individuals in the vicinity of the SRWEC. The receivers in the nearshore fine-scale positional array (Figure 11) are planned to be spaced approximately 400 m apart, but the exact receiver spacing will be informed by range testing performed by the research team at a nearby location. The VR2AR-X receivers are equipped with built-in transmitters to sync with adjacent receivers (Vemco Positioning System), enabling the two-dimensional position of tagged individuals to be evaluated with high precision. Additionally, telemetered elasmobranchs tagged with V16TP transmitters can be positioned in three dimensions (latitude, longitude, and depth) within the fine-scale positioning array.

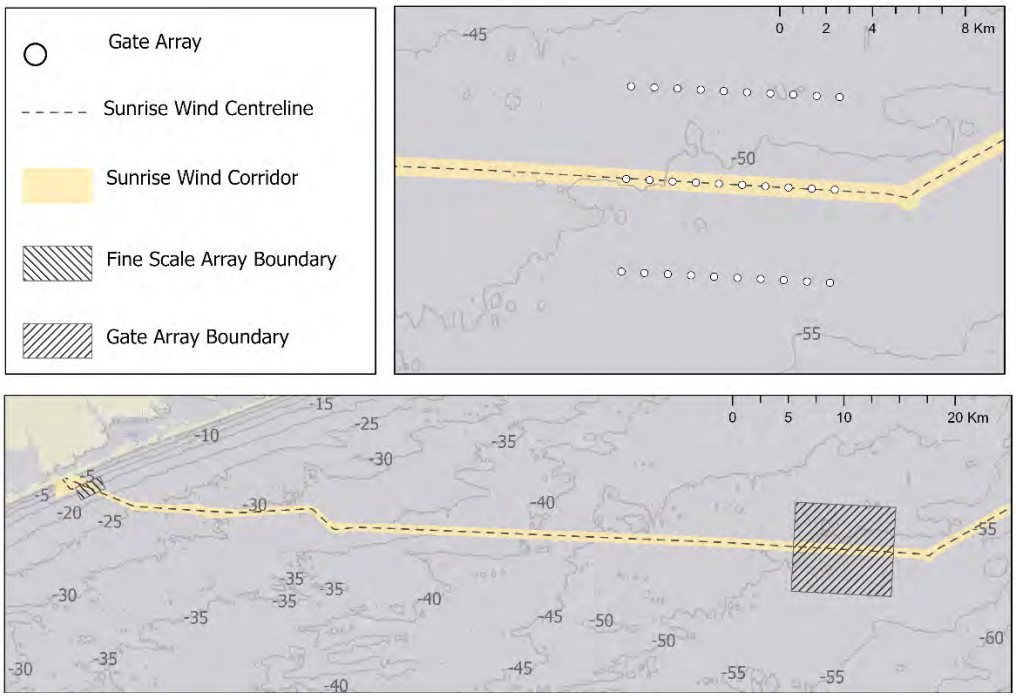


Figure 10. Indicative diagram of the offshore receiver array that will be deployed. The offshore receiver array consists of three linear gates, each of which has 10 VR2-AR receivers spaced approximately 1 km apart. One gate of receivers will be positioned along the centerline of the SRWEC, and gates of receivers will be deployed north and south of the SRWEC to evaluate movement metrics. The exact locations of receiver deployments has not yet been determined, and will be informed by ongoing outreach efforts.

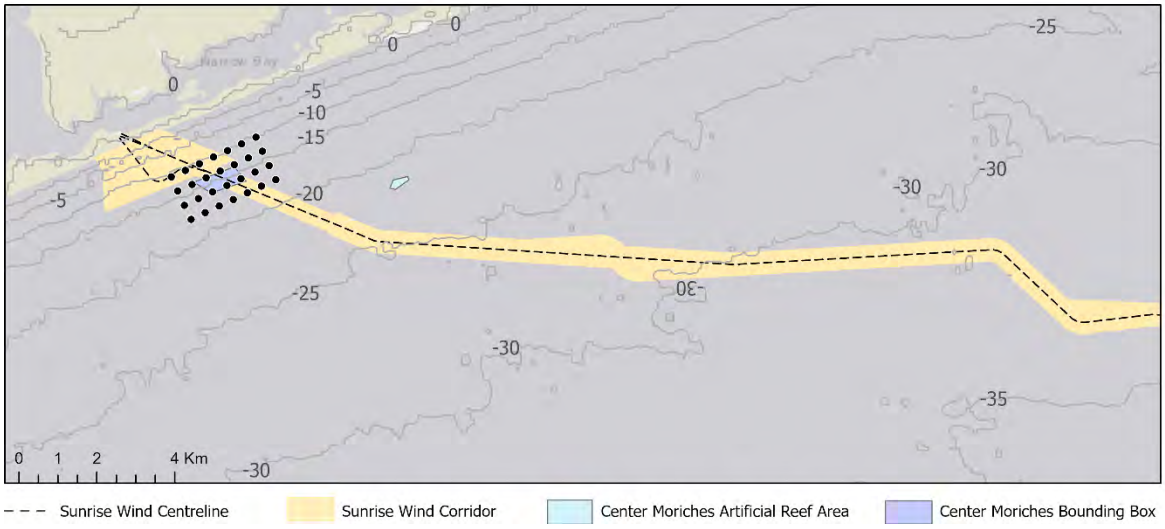


Figure 11. Indicative diagram of the near-shore, fine-scale positioning array. The array overlaps with the SRWEC route and includes four rows of eight receivers (32 receivers total) deployed approximately 400 m apart to allow individual animals to be tracked with high spatial resolution. The exact locations of receiver deployments has not yet been determined, and will be informed by ongoing outreach efforts.

The VR2AR-X receivers are equipped with acoustic release mechanisms that allow instrument retrieval without the need for surface buoys and vertical lines in the water column. Ropeless technology (Acoustic Release Buoys) was selected to minimize risks to marine mammals and other protected species. The receivers will be deployed approximately two meters from the benthos, and two small floats keep the receiver oriented vertically in the water column to maximize the detection radius. Retrieval is performed with wireless communication from a VR100 aboard the vessel that triggers the release, using a push-off titanium pin and an attached floatation buoy to bring the released receiver to the surface.

The entire receiver array will be downloaded twice per year, during which time the receivers will be cleaned of any biofouling, and the batteries will be replaced as needed. The receivers will be rigged inside a pop-up canister (Mooring Systems Inc) to enable to moorings (75 pounds pyramid anchors) to be retrieved during download trips, and to enable to moorings to be removed from the study site at the end of the monitoring. Downloading the receiver arrays twice per year will help to mitigate receiver loss and will also promote a greater probability of data integrity and allow any lost receivers to be replaced with no more than a 6-month gap in data at any one location. The potential for receiver losses will also be mitigated by deploying the receiver arrays strategically in areas with limited mobile gear fishing effort.

The telemetry methods planned for the SRWEC are designed to be compatible with and complementary to other planned and ongoing offshore wind-related acoustic telemetry monitoring efforts that are funded by Orsted. Sunrise Wind, Revolution Wind, and South Fork Wind are funding a multi-year acoustic telemetry study to investigate the movements and behavior of HMS within the WEA's (see Section 4.2). In addition, South Fork Wind has partnered with researchers at Stony Brook University, Cornell Cooperative Extension, and Monmouth University to carry out a five-year acoustic telemetry monitoring study in New York state waters to investigate the potential impacts of the South Fork Export Cable (SFEC) on the following commercially and recreationally important species; striped bass, black sea bass, winter skate, summer flounder, and winter flounder (Figure 12, Inset map C). Acoustic telemetry monitoring along the

Survey Methods

SFEC commenced in August 2021, with the research target to deploy 620 transmitters over the course of the five-year study. These animals will be tracked using an array of approximately 41 VR2-AR receivers. The SFEC will make landfall at East Hampton, NY, which is approximately 35 miles from the landfall of the SRWEC.

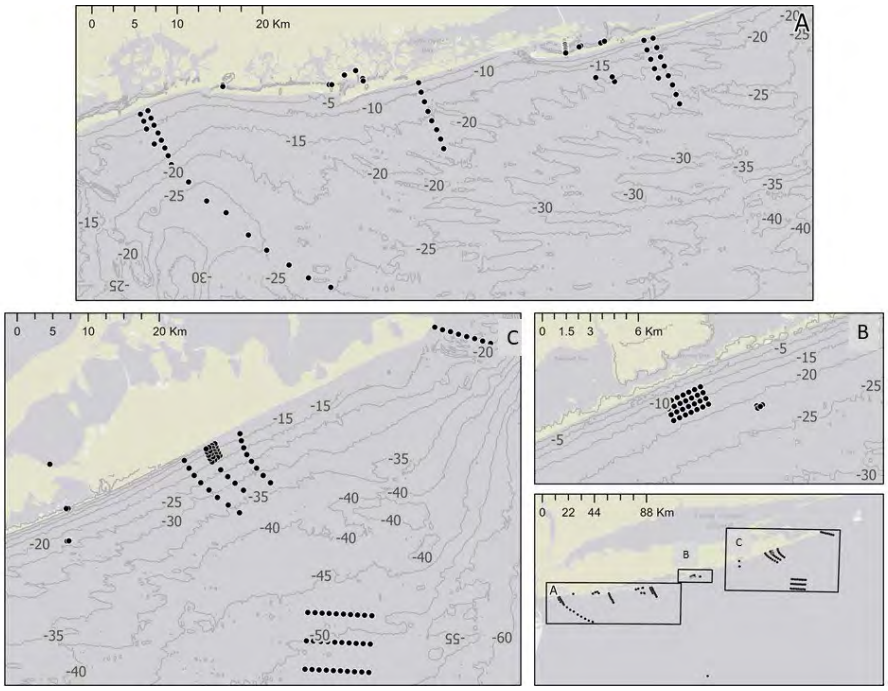


Figure 12. Existing receiver arrays along the south coast of Long Island that are currently maintained by Dr. Michael Frisk's lab at Stony Brook University. The receivers deployed for the SFEC monitoring study are shown in Inset Map C. Receiver arrays planned for this project are also included in the map (Inset Maps B and C).

Throughout the northwest Atlantic, researchers are maintaining acoustic receiver arrays and tracking telemetered fishes. The Principal Investigators are involved in a wide range of acoustic telemetry networks and maintain receiver arrays in the coastal ocean and estuaries in the New York Bight. All telemetered fish that are tagged as part of the Principal Investigator's ongoing efforts will be included in the analyses. Inclusion of these transmitters will greatly increase the number and species of telemetered individuals in the proposed study. For example, the New York Bight Acoustic Network run by Dr. Frisk's research group maintains a receiver array network from Rockaways to Montauk, NY, deploys acoustic receivers as "gates" across all inlets to Great South Bay, NY, and tags over 150 fish per year (Figure 12). Dr. Sclafani maintains an acoustic array for horseshoe crabs in Moriches Bay, NY, and Dr. Peterson runs an artificial reef acoustic tagging and tracking network in the coastal ocean that includes Fire Island, Moriches, and Shinnecock Artificial Reefs, as well as Shinnecock Inlet and Peconic Bay. In addition, the receiver array at the nearby SFEC route, as well as the receiver array offshore at the Orsted/Eversource lease sites within the MA/RI WEA will allow for the movements of tagged animals to be tracked across multiple habitats during their cross-shelf migrations and will allow for an evaluation of connectivity between nearshore and offshore habitats. The synergies between these ongoing projects will place the results in a regional context as individuals migrate along the Northeast US shelf.

4.3.3 Outreach for the Sunrise Wind Export Cable Acoustic Receivers Arrays

Proactive outreach and engagement efforts have occurred to alert fishermen and regulatory agencies of the planned acoustic monitoring studies along the SRWEC, and several mitigating steps have been taken to minimize the likelihood of interactions between the acoustic receivers and mobile gear fishing effort. The proposed methods for this acoustic telemetry study was presented to state and federal agencies starting in 2021, including meetings with staff at BOEM, NOAA, RIDEM, MADMF, MACZM, NYDPS, NYDOS, NYDEC, and RICRMC. The SRWEC telemetry studies were also presented to fishing industry groups such as the NYSERDA Environmental-Technical Working Group and Fisheries-Technical Working Group, as well as the RICRMC Fishermen's Advisory Board and the Massachusetts Fisheries Working Group.

Beyond these formal meetings, the Orsted Marine Affairs team also conducted extensive outreach for the SRWEC telemetry project. That outreach started in the winter of 2022, and that outreach will continue prior to the deployment of the receiver arrays, and communication and outreach will throughout their deployment. Outreach thus far has included providing fishermen with nautical charts that included the proposed locations of acoustic receivers, and with fact sheets that provided information about this telemetry project (see Appendix D). At the request of local fishermen, the proposed receiver locations were overlaid on nautical charts, to help them better understand the potential for interactions between the receiver arrays and their fishing effort. Sunrise Wind is also working with a local marine electronics company to upload GIS shapefiles of the proposed receiver locations to a USB drive, which the fishermen can plug into their wheelhouse computers to evaluate how the proposed receiver locations intersect with their tow tracks. Conversations with fishermen focused around understanding the potential for interactions between the acoustic receivers and fishing effort, particularly mobile gear fishing effort. Input from Orsted's Fisheries Liaisons and Fisheries Representatives were also used to identify areas of consistent mobile gear effort.

Feedback from fishermen, particularly those homeported in Long Island, is being used to modify the proposed receiver locations for both the inshore and offshore arrays along the Sunrise Wind Export Cable Route. Fishermen from Long Island stated that the proposed locations for the inshore receiver array overlapped substantially with their seasonal squid fishery, which primarily occurs in the late spring, and again in late summer or early fall. We will respond to this feedback by working with the researchers at Stonybrook University and Cornell Cooperative Extension to move these receiver locations further inshore, into shallower water where there is anticipated to be less potential for interactions with the otter trawl fishery. Conversations with scallop fishermen revealed that the proposed locations of receivers in the offshore array was likely going to overlap with areas of mobile gear fishing effort, including fisheries targeting scallops, squid, and summer flounder. In response, the location of the receiver array will be shifted further to the west, in order to help minimize the potential for conflicts with mobile gear fishing effort. We will continue to consult with local fishermen to identify the most suitable locations for both receiver arrays prior to their deployment in June or July of 2022.

Sunrise Wind has also developed a robust communication plan to ensure that the fishing industry is given advance notice of planned field activities. Orsted will issue a Mariners Briefing before any of the receivers are deployed, and the Mariners Briefing will be distributed electronically and posted on the Orsted

website[8]. The Orsted Marine Affairs team will also disseminate information about the timing and location of receiver deployments to the United States Coast Guard, who will then include this information in their Notice to Mariners Briefing. If there are significant changes to the receiver locations from what was disseminated to the fishing industry, Sunrise Wind will work with Marine Affairs to issue an updated Mariners Briefing as soon as possible. In addition, updated Mariners Briefings will be disseminated throughout the duration of the project if the receiver positions change from their original locations (e.g., following a receiver download trip).

4.3.4 Data Analysis and Data Sharing

The primary research objective is to evaluate the effects of EMF on the movement of sandbar sharks, sand tiger sharks, dusky sharks, spiny dogfish, Atlantic sturgeon, horseshoe crab, and lobster. The following hypothesis will be tested to evaluate any potential impacts associated with the operation of the SRWEC.

$H1_a$: Movements and behavior of teleost, elasmobranchs, horseshoe crab, and lobster species will not be impacted during wind farm operation by the EMF produced by the SRWEC.

A_{a1}: Rate of movement is different between the cable array and approach arrays.

A_{a2}: Residency is different between the cable array and approach arrays.

A_{a3}: Depth preference is different between the cable array and approach arrays.

A_{a4}: Acceleration is different between the cable array and approach arrays.

A_{a5}: Counts of unique detections are different between the cable array and the approach arrays.

Statistical analysis - The design of the receiver arrays allows for a traditional test(s) of $H1_a$ with the approach arrays serving as controls. GLMs will be utilized to evaluate the hypothesis for each species. GLMs provide a flexible modeling approach that allows for continuous and categorical predictors and can utilize any distribution in the exponential family (Nelder and Wedderburn 1972) for response variables, including count, proportions, presence-absence, and continuous data. GLMs have been successfully applied to acoustic telemetry data to analyze drivers of fish behavior (Ziegler et al. 2019; Ingram et al. 2019). The approach can be tailored to evaluate the alternative hypotheses utilizing various statistical distributions suited for the variety of response variables and a mixture of categorical and continuous predictors. In addition, covariates can be included such as temperature, season, photoperiod, etc. to determine important drivers of behavior and improve model statistical fit and performance.

Detailed temporal and spatial behavior will be estimated for animals detected within the fine-scale array. The fine-scale array provides two-dimensional and three-dimensional (for animals with depth tags) positioning. Fine-scale positioning is performed by Vemco utilizing the company's software and analysts. The Vemco approach focuses on three metrics: yield, precision, and accuracy to characterize spatial and

[8] Offshore Wind Farm Information for Mariners | Ørsted (orsted.com)

temporal behavior. To position a telemetered individual, it needs to be detected by three time-synchronized receivers. The rate of valid detections can be influenced by weather conditions, temperature, and other factors and is measured as the yield of transmissions successfully detected in the array. The precision and accuracy of positions are estimated by Vemco and provided as part of the positioning service. The project research team have consulted with Vemco for receiver positioning designs to produce robust results in constructing the array design. Processed data consist of tag identification, detection time, latitude, longitude, depth, and an estimate of the horizontal position error (HPE) for each relocation. The result can provide a highly resolved analysis of spatial and temporal behavior showing specific movement tracks for individual animals throughout the receiver array.

In this project, the position of all tagged fish detected within the fine-scale array will be evaluated to determine if spatial and/or temporal trends exist for individual species and the species assemblage. The positioning approach will provide detailed movements and can indicate areas of high habitat use, trajectories (e.g., tortuous or linear), and rate of movement (ROM). The temporal and spatial analysis will address $H1_a$ by providing a detailed view of behavior along the SRWEC. In addition to positioning, the fine-scale array produces metrics that can be used to evaluate the effects of EMF. Unique counts, residence, depth, and specific pathways for all species telemetered will be used to estimate behavior and use of each receiver location within the cable array. These metrics will be statistically compared to evaluate whether telemetered individuals at receivers close to the export cable show different behavior than at receivers further away.

Finally, a network connectivity analysis will be conducted to determine areas of high habitat connectivity and use. A network connectivity analysis provides estimates of the level of habitat use of nodes (receivers) and connectivity to other nodes (movement path) in the network (Bopp et al., in press). The approach estimates degree and eigenvector centrality to evaluate habitat use and linkages throughout the array (Lookingbill et al. 2010; Jacoby et al. 2012; Ledee et al. 2015). Degree centrality is a measure of the number of direct connections to a node and can be calculated as the number of movement connections into a node, out of a receiver node, or as a total for both directions. Degree centrality can be perceived as a proxy of important connection centers within a network, or “hubs.” Eigenvector centrality quantifies the relative influence a location (node) has on overall habitat connectivity in the network. It incorporates a node’s own degree centrality and the degree centrality of each receiver connected to it and is a proxy of preferred space-use by animals.

Network analyses will include all species and covariates (temperature, season, etc.) to determine environmental and seasonal trends and strengthen model fit and performance. Specifically, the analysis will determine if habitats along the cable EMF shows increased or decreased connectivity and use by telemetered individuals. The network analysis will also determine if connectivity and habitat use changed during pre-construction, construction, and post-construction periods.

Reporting - Annual reports will be prepared after the conclusion of each year of telemetry monitoring and shared with state and federal resource agencies. Following the conclusion of the monitoring study, one final report will also be produced synthesizing the findings of the pre- and post-construction evaluations. Sunrise Wind will also coordinate with their research partners at Stony Brook University and Cornell University to disseminate the annual monitoring results through a webinar or an in-person meeting, and this meeting will also offer an open forum for federal, state, and academic scientists, as well as members of the local fishing industry, to ask questions or provide feedback on monitoring approach.

Data Sharing - Downloaded acoustic data will be uploaded to the MATOS and Atlantic Cooperative Telemetry Network (ACT_MATOS). ACT_MATOS is a secured data portal where archived acoustic telemetry data and matched transmitter detections are shared and distributed between researchers. Data

collected to address the objectives of the SRWEC monitoring study will be shared to a limited extent until two years after completion of the project. This is to allow the students and PI's to complete dissertations and publish research in peer-reviewed publications. The ability of researchers to complete dissertations and research papers is fundamental to the academic process. Detections of telemetered individuals that were tagged by other researchers will be provided to MATOS following each receiver download event. Telemetered individuals that were tagged as part of this research project will be uploaded on MATOS with the tag identification and species; additional metadata will not be uploaded until two years after completion of the project (e.g., length, weight, date of capture).

4.4 SCALLOP SURVEY

Following their review of the draft fisheries monitoring plan, we received feedback from staff at NOAA and RI CRMC, as well as from members of the Fishermen's Advisory Board to include a survey to evaluate changes in the abundance of sea scallops (***Placopecten magellanicus***) in the Sunrise Wind Fisheries and Benthic Research Monitoring Plan. In response to that feedback, Sunrise Wind has amended this plan to include an optical survey for scallops within the lease site, and a nearby control area. Scallops have been previously recognized in several studies as an indicator species that should be prioritized for monitoring the impacts of offshore wind development (e.g., Malek, 2015; Petruny-Parker et al., 2015, NMFS, 2015; MADMF, 2018). Beyond assessing changes in the relative abundance of scallops, members of the Fishermen's Advisory Board also expressed concern about the potential for sub-lethal impacts to sea scallops, namely scallop meat quality. In response to this feedback, Sunrise Wind has also updated the monitoring plan to include an examination of meat quality for scallops captured during the trawl survey (see Section 4.1.3).

In 2019, scallop landings in US waters were nearly 61 million pounds, equating to an ex-vessel revenue of $569.9 million to the US fishing fleet, with the majority of scallops landed by vessels from Massachusetts and New Jersey (NMFS, 2021). The sustainable management of scallops, combined with the high ex-vessel value, has contributed to the profitability of the scallop fishery. In 2015 and 2016, there was directed fishing effort for scallops within the Sunrise Wind lease area, primarily in the central portion of the lease site, where fishing effort (as characterized using VMS) ranged from 'medium-low' to 'very high' (Figure A-10). There was also fishing effort for scallops in central portion of the Sunrise Wind lease site from 2011 through 2014 (Figure A-9), albeit at lower densities than were observed from 2015 to 2016. Based on VMS data from 2011 through 2016, there was also directed fishing activities for scallops along the SRWEC route, and the level of directed fishing effort was characterized as ranging from 'low' to 'high'. Recent conversations between Orsted Marine Affairs and local fishermen confirmed that the scallop fishery is still active along portions of the Sunrise Wind Export Cable route.

Based on the most recent assessment (NEFSC, 2018) the Atlantic sea scallop stock is not overfished and is not experiencing overfishing. Biomass was estimated to be 2.7 times greater than the management target, and the estimated fishing mortality rate (0.12) was much lower than the target fishing mortality reference point (0.64). Biomass in 2018 was the highest estimated value in the assessment time series (1975-2017), with recent biomass increases driven in large part by the exceptionally large year classes observed in 2012 on Georges Bank and in 2013 in the Mid-Atlantic.

There are three fisheries-independent indices of abundance that are currently used as inputs to the scallop stock assessment model; the drop-camera survey conducted by the UMass Dartmouth School for Marine Science and Technology (SMAST), the Habitat Mapping Camera (HabCam) survey that is conducted by Coonamessett Farm Foundation, and dredge surveys that are carried out by the Northeast Fisheries Science Center (NEFSC) and the Virginia Institute of Marine Science (VIMS). HABCAM survey data collected from 2011-2017 was included in the most recent scallop assessment (NEFSC, 2018). That assessment report also noted that optical surveys may perform better than dredge surveys in areas with dense scallop aggregations, because the efficiency of the survey dredge can be reduced at high densities (NEFSC, 2018). Optical surveys also offer the advantage of accurately documenting areas containing abundances of recently settled juvenile scallops, which may not be sampled as effectively by dredge surveys (Rudders, 2015).

Survey Methods

Sunrise Wind will partner with researchers at Coonamessett Farm Foundation (CFF) to carry out HabCam survey for scallops and other benthic organisms within the SRWF and a nearby control area, and the survey will be executed using a BACI design. Similar to other fisheries-independent surveys for scallops in the region, the survey will be executed once per year, targeting sampling in summer. The target is to achieve two years of pre-construction monitoring, and the survey will continue during construction, and for at least two years after construction is completed. This survey will be carried out in collaboration with a local scallop vessel(s). The primary objective of the HabCam survey is to investigate the relative abundance of scallops and other resources in the SRWF Area ("SRW impact") and reference area ("control") over time. Using the HabCam survey equipment and protocols will ensure that the data collected as part of this fisheries monitoring plan will be compatible and standardized with fisheries-independent data that is used to inform scallop science, stock assessment, and management. The HABCAM survey approach also is well-suited to sampling within the lease area following construction.

The towed-array vehicle is outfitted with dual cameras, which take 6 overlapping, paired images per second (518,400 paired images per day), continuously throughout its track. The system is "flown" 1.5 to 2.5 meters off bottom while being towed at 4-5 knots. A survey track approximately 100-120 nm long is imaged during each 24 hours of operation while at sea. The field of view of the HabCam v3 system is around 1.0 m^2 yielding approximately 180,000 - 220,000 m^2 of area surveyed per 24-hour period. The survey will operate 24 hours per day, consistent with the methods that are used during the RSA funded surveys. Images will be annotated every ~100 meters throughout the continuous track lines for key species and sediment type using a version of software developed by the Visual Geometry Group (VGG) at Oxford University which has been updated and modified for CFF's HabCam survey needs. This survey approach will enable the abundance and distribution of scallops and other species to be evaluated as a function of distance from the nearest turbine foundation. Counts and densities will be derived from annotated images for the following species; scallops, winter skate, little skate, barndoor skate, summer flounder, silver hake, red hake, monkfish, Jonah crab, lobster, yellowtail flounder, winter flounder, windowpane flounder, white hake, ocean put, and spiny dogfish. In addition, sea scallop lengths will be measured, and scallop meat weights will be estimated with the current shell-height/meat-weight equations used for scallop assessments. Data will be aggregated over short track segments to reduce the impacts of spatial autocorrelation, and we will use a mixed-model framework to assess the impacts of wind construction on species distributions, including other factors related to habitat type and environmental variables like temperature and depth.

The vehicle is equipped with strobe lights (to reduce blur in imagery) and integrated sensors to track salinity, temperature (benthic temperature and vertical casts), depth, and altitude. This type of sensor-based data is extremely valuable, as it allows for the evaluation of fine-scale variations in bottom temperature and other factors that govern productivity. By integrating imagery and its suite of associated sensor data, the HabCam v3 gives a unique insight into the marine environment by providing a holistic snapshot of the ecosystem in a specific area at fixed moment in time. HabCam vehicles have been used to identify emerging habitats; produce distribution and abundance estimates for species; provide length, count, and growth data for species; identify habitat changes or long-term trends; detect potential seasonal warm core rings; and illustrate information on inter- and intra-species behaviors and relationships. HabCam surveys have the ability to collect critical species and habitat data from between and around planned turbines both pre- and post- construction in order to assess and quantify changes or impacts due to the implementation of wind farms.

The objectives associated with the HabCam survey are as follows:

- **Objective 1**: Evaluate changes in the relative abundance of scallops between SRWF and the control area pre-construction, during construction, and post-construction.
- **Objective 2**: Assess changes in the size structure of scallops between SRWF and the control areas pre-construction, during construction, and post-construction.
- **Objective 3**: Investigate changes in the composition of fish and invertebrate species (e.g., skates, flounder, hake, lobster, Jonah crab, monkfish) between SRWF and the control area pre-construction, during construction, and post-construction.

Sunrise Wind is currently working with researchers at Coonamessett Farm Foundation to develop the sampling protocols and statistical analyses associated with this survey, and those details will be included in a future iteration of this monitoring plan once they are available.

4.5 BENTHIC MONITORING

Installation and operation of offshore wind (OSW) projects can disturb existing benthic habitats and introduce new habitats. The level of impact and recovery from disturbance can vary depending on existing habitats at the site (Wilhelmsson and Malm 2008; HDR 2020). Physical disturbance associated with cable and foundation installation can temporarily affect the benthic environment, removing or damaging existing fauna. Over time, the introduction of novel hard substrata (OSW foundations, scour protection layers, and cable protection layers) can lead to extensive biological growth on the introduced surfaces with a complex pattern analogous to shoreline intertidal to subtidal zonation (artificial reef effect, Petersen and Malm 2009; Reubens et al. 2013b; Degraer et al. 2020). Depending on the community composition and density, this biological growth may lead to substantial shifts in the transfer of energy from the water column to other compartments of the ecosystem including the sediments and upper trophic levels. For example, it is expected that increased biomass of filter feeders inhabiting the novel OSW hard surfaces will facilitate the export of organic material from the water column to the benthos and to higher trophic levels.

Observations from existing OSW projects, in Europe and at the BIWF, lead to several prevailing hypotheses of likely benthic effects related to the planned Sunrise Wind Project including:

Introduction of novel surfaces (foundations, scour protection, and cable protection layers) will develop epifauna that vary with depth (WTG foundations) and change over time. ***[Hard Bottom – Novel Surfaces]***[9] (as reviewed in Langhamer 2012).

The artificial reef effect (epifaunal colonization) associated with the offshore wind structures will lead to enrichment (fining and higher organic content) of surrounding soft bottom habitats. [***Soft Bottom – WTG-associated***] (e.g., Lefaible et al. 2019).

[9] Boulders are not prevalent at the SRWF or along the SRWEC-OCS. As such, boulder relocation will be minimal. Therefore, the recolonization of relocated boulders will not be monitored at SRWF or along the SRWEC-OCS.

Survey Methods

Physical disturbance of soft sediments from cable installation will temporarily disrupt function of the infaunal community, community function is expected to return to pre-disturbance conditions. [***Soft Bottom – Cable-associated***] (e.g., Kraus and Carter 2018).

The consequences of these predicted effects may affect the role of soft and novel hard bottom habitats in providing food resources, refuge, and spawning habitat for commercial fish and shellfish species (Reubens et al. 2014; Krone et al. 2017). This operational monitoring plan is organized according to these prevailing hypotheses and describes the overall approach to tracking changes in both the novel hard bottom and soft bottom habitats associated with OSW development, specifically at the SRWF and SRWEC-OCS. A separate benthic monitoring survey for the SRWEC-NYS will be conducted within NYS waters, which is presented in a separate monitoring plan (INSPIRE Environmental in prep.). A comprehensive outline of the benthic monitoring plan, including the hypotheses, sampling schedule, and general approach for each monitoring component is provided in Table 11. Benthic monitoring that is planned for New York State waters is described in a separate monitoring plan.

Novel hard bottom habitat monitoring at turbine foundations, scour protection layers, and cable protection layers will focus on measuring changes in percent cover, species composition and volume of macrofaunal attached communities (native and non-native species groups) and physical characteristics (rugosity, boulder density). These parameters will serve as proxies for resulting changes to the complex food web.

Soft bottom habitat monitoring will focus on measuring physical factors and indicators of benthic function (bioturbation and utilization of organic deposits, Simone and Grant 2020), which will serve as proxies for functional changes in the community composition. It is expected that the introduction of fines and organic content sourced from the epibenthic community on the WTG foundations will support increased deposit feeding benthic invertebrate communities in the soft sediments around the structures. This monitoring plan is not designed to answer research questions about specific causes and effects on individual species.

Table 11. Summary of the Benthic Monitoring Plan Including Hypotheses, Approach, and Sampling Schedules for Each Component

Novel Hard Bottom Habitats		Soft Bottom Habitats	
WTG Foundations and Scour Protection Layers	**Cable Protection Layers (SRWEC-OCS)**	**WTG-associated**	**Cable-associated**
Hypothesis: epifaunal community will vary with water depth (zonation with light and tide); successional development over time Approach: Use ROV/video to measure changes in % cover, identify key or dominant species, and volume (biomass), compare across depths and habitat strata Design: stratified random selection of WTG foundations within benthic habitat strata [same WTGs and soft bottom] Y0 – late summer after construction Y1- ROV/video Y2- ROV/video Y3- ROV/video Y5 – ROV/video	Hypothesis: successional colonization of epifaunal community over time is expected Approach: Use ROV/video to measure changes in % cover, identify key or dominant species, and volume (biomass), compare across habitat strata Design: stratified random selection of cable protection layer areas within benthic habitat strata Y0 – ROV/video, late summer after construction Y1- ROV/video Y2- ROV/video Y3- ROV/video Y5 – ROV/video	Hypothesis: WTG epifaunal growth will result in sediment fining and higher organic content in surrounding soft bottom, this will support deposit feeding benthic inverts. Effects will decrease with increasing distance from WTG. Approach: Use SPI/PV to measure changes in benthic function over time and with distance from WTGs Design: stratified random selection of WTG foundations within benthic habitat strata [same locations as novel hard bottom survey]; BAG design at each selected WTG Pre seabed prep – within 6 mo prior Y0 – late summer after construction Y1 – SPI/PV Y2 – SPI/PV Y3 – SPI/PV Y5 – SPI/PV	Hypothesis: After initial physical disturbance during construction, soft sediment community function expected to return to pre-conditions; effects will decrease with increasing distance from cable Approach: Use SPI/PV to measure changes in benthic function over time and with distance from cable centerline Design: stratified random selection of cable segments within benthic habitat strata; BAG at each selected cable segment Y0 – late summer after construction Y1 – SPI/PV Y2 – SPI/PV Y3+ – TBD, after SRWEC-OCS installation if benthic function indistinguishable from baseline and no difference with distance from cable line, no further monitoring required.

4.5.1 Novel Hard Bottom Habitats Monitoring

Hypothesis 1: Introduction of novel offshore wind surfaces will develop epifauna that vary with depth (WTG foundations) and change over time.

The hard bottom monitoring will include an examination of three types of OSW novel surfaces: WTG foundations (including scour protection layers), cable protection layers (SRWEC-OCS), and the converter substation foundation (OCS-DC jacket). The primary objective of the novel hard bottom survey is to measure changes over time of the nature and extent of macrobiotic cover of hard bottom associated with OSW development. Macrofaunal percent cover, identification of key and dominant species, and the relative abundance of native and non-native organisms will be documented using a Remotely Operated Vehicle (ROV) and video surveying approach. Distinguishing non-native organisms will likely require physical sampling for accurate identification, which will be facilitated by a sampling arm attached to the ROV.

It is expected that the epifaunal community that colonizes the WTG foundations will vary with water depth, dictated by the availability of light and tides, similar to zonation patterns commonly observed at rocky intertidal habitats. Previous studies in Europe and at the BIWF found biological growth led to dense accumulations of filter feeding mussels on the turbine foundations followed by amphipods, tunicates, sponges and sea anemones in the subtidal (De Mesel et al. 2015; HDR 2020; Wilber et al. 2021; Hutchison et al. 2020b). Other studies have tracked and documented vertical zonation of epibenthic communities along the surface of wind turbine structures (Bouma and Lengkeek 2012; Hiscock et al. 2002; HDR 2020). At any given depth of the offshore wind structure, the epifaunal species composition is expected to develop successionally, with rapid opportunistic organisms pioneering the site and being

replaced by more long-lived established species. Tracking the changes in species composition and density (percent cover) will inform predictions about changes in prey availability to fish and will be integrated with results of the stomach content data obtained for summer flounder and black sea bass during the trawl survey.

4.5.1.1 Technical Approach – Video Imagery

To accomplish the objectives of the novel hard bottom monitoring, high resolution video imagery captured using an ROV will be employed. Video imagery will be used to document epifaunal community characteristics on the novel hard surfaces (WTG foundations and scour protection layers, OCS-DC jacket, cable protection layers).

State of the art underwater video at predefined depth intervals along the turbine foundations and OCS-DC jacket will capture high resolution images that will be analyzed using photogrammetry methods. Photogrammetry is the process in which imagery is interpreted to provide detailed information about the physical objects observed in space. Photogrammetry generates high-resolution, photo-realistic 3D models from static images captured from multiple perspectives. By digitally reconstructing segments of the foundations and jackets at predefined depth intervals, the resulting model can be analyzed for quantitative variables including percent cover, standing biomass, and abundance of individual taxa of interest. Collecting imagery and constructing spatial photogrammetric models of segments of the structures soon after construction will provide initial reference conditions that can be used to track biological changes over time following subsequent years of data collection. Biological data obtained through photogrammetry can be used to estimate ecological functions including secondary production, and physiological rates such as biodeposition associated with the epifaunal community. These biological processes have implications to the transfer of energy to higher trophic levels and to the sediments at the base of the novel structures. This approach will provide an estimate of the increase in standing stock biomass at the basal trophic levels where filtering feeding epifauna (e.g., blue mussels, sea squirts) exist. This information can inform ecosystem models that seek to understand how these changes to the basal trophic level may alter food web dynamics, objectives that are beyond the scope of this monitoring plan.

4.5.1.2 Survey Design

An ROV video survey is planned to monitor novel hard bottom habitats (WTG foundations and scour protection layers, OCS-DC jacket, cable protection layers) within subareas of the SRWF. A stratified random design, with benthic habitat types as strata, will be used to select the WTG foundations and cable protection areas that will be monitored. There is only one OCS-DC jacket in the project design; it will be selected for monitoring. The same WTG foundations and the OCS-DC jacket selected for this novel hard bottom survey will be monitored as part of the soft sediment survey (see Section 4.5.2.2). This will help facilitate synthesis between the degree of enrichment in the surrounding soft sediments and the epifaunal community composition and density colonizing the turbine foundations at any given time and location.

Benthic habitat mapping results, that are forthcoming, will inform the number of sampling strata. No more than 4 to 5 distinct benthic habitats are expected based on preliminary habitat mapping analysis at SRWF (Figure 13) and along the SRWEC-OCS (Figure 14). Within each habitat strata three WTG locations (SRWF) or cable protection areas (SRWEC-OCS) will be randomly selected. As soon as practicable, following the completion of the WTG foundation and cable installation, an ROV will be used to collect reference video imagery of the underwater surfaces (i.e., turbine foundations down to the scour protection layer, cable protection area). The survey will be repeated at annual intervals indicated in Table 11, coinciding with the soft bottom Sediment Profile and Plan View Imaging (SPI/PV) survey. The visual surveys of the WTG foundations will occur around the circumference of the structures at different elevations from the sediment surface (including the scour protection layer) to the water surface. Data will

be collected on the percent cover of macrofauna and macroalgae, composition of native and non-native organisms, and distribution of key suspension feeding organisms that could contribute to benthic enrichment (e.g., mussels, tunicates, tube-building amphipods). Beyond informing an understanding of the colonization and community composition associated with the novel substrates, this information will also be considered as explanatory variables for the magnitude and range of benthic enrichment observed in the soft bottom habitat surrounding the turbines.

The sampling schedule for this component will mirror the WTG soft bottom habitat monitoring schedule (Table 11). Monitoring at the novel habitats will begin after construction is complete (i.e., after all infrastructure has been installed) during late summer or early fall, and sampling will be repeated annually at time intervals of 1, 2, 3, and 5 years after construction. Sampling will occur during late summer or early fall to capture peak biomass and diversity of benthic organisms, and the seasonal timeframe of sampling is intended to be in alignment with previous and planned regional studies. Benthic habitats, particularly hard bottom habitats, in the northwest Atlantic are generally stable with little seasonality in the absence of physical disturbance or organic enrichment (Steimle 1982; Reid et al. 1991; Theroux and Wigley 1998; HDR 2020).

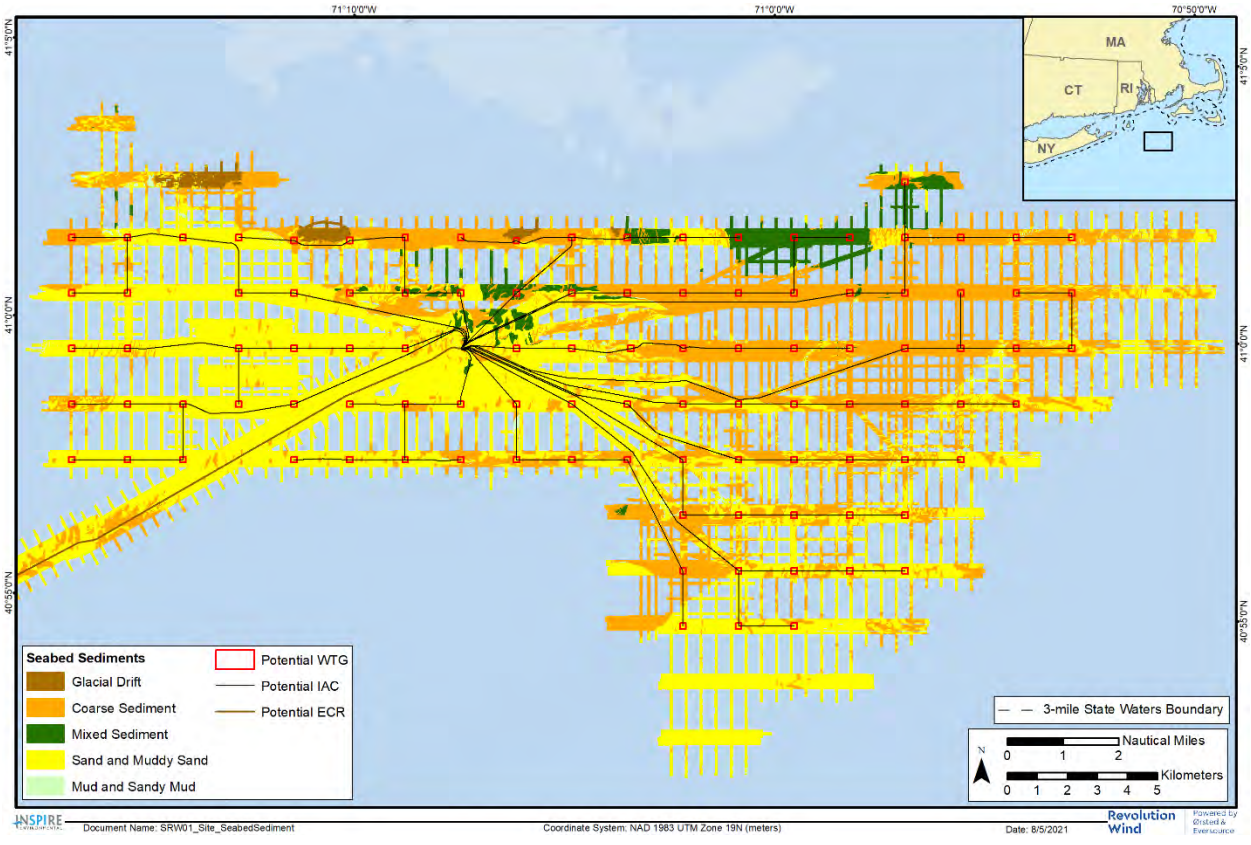


Figure 13. Preliminary seafloor sediment map around planned turbine and cable installations at the SRWF. Turbine foundations for both the novel surfaces and soft bottom monitoring will be randomly selected stratified by habitat type.

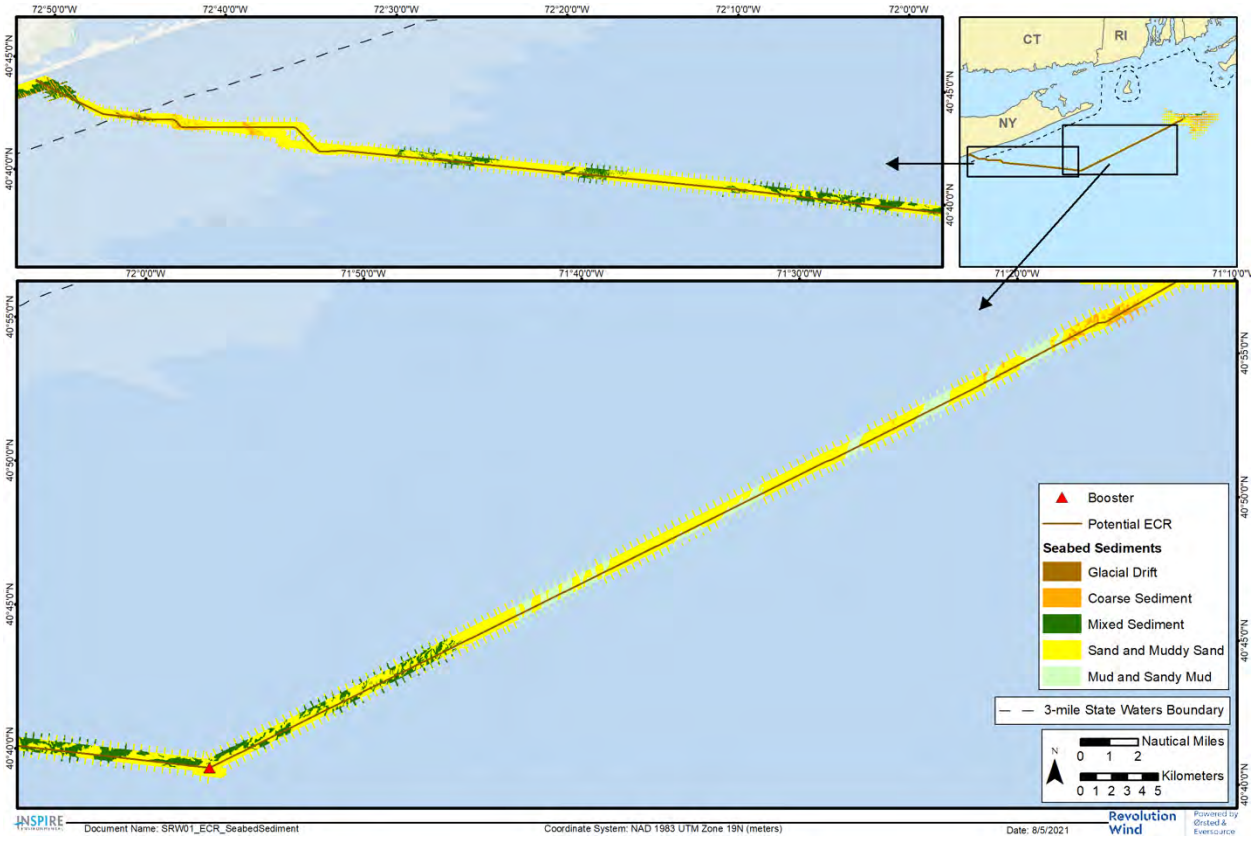


Figure 14. Preliminary seafloor sediment map around planned cable installations along the SRWEC-OCS. Cable protection areas will be randomly selected, stratified by habitat type, for monitoring.

4.5.2 Soft Bottom Monitoring

Hypothesis 2: The artificial reef effect (epifaunal colonization) associated with the offshore wind novel structures will lead to enrichment (fining and higher organic content) of surrounding soft bottom habitats.

Hypothesis 3: Physical disturbance of soft sediments from cable installation will temporarily disrupt function of the infaunal community, community function is expected to return to pre-disturbance conditions.

The soft bottom monitoring will include an examination of two OSW components: WTG foundation-associated and export cable-associated soft bottom. The overall objective of the soft bottom benthic monitoring survey is to measure potential changes in the benthic function of soft bottom habitats over time, and to assess whether benthic function changes with distance from the base of the WTG foundations or SRWEC-OCS centerline. A high density of fishing activity (trawling and dredging) occurs in the SRW Project area. This was particularly evident through the geophysical data collected in the Project area (Figure 15). Frequent trawling and dredging activity is likely a significant source of disturbance on the soft sediment habitats in the area. Fishing activity will be considered during survey planning and will be accounted for during data interpretation as a potential press disturbance.

Benthic functioning of the soft bottom habitats will be captured by documenting physical parameters (grain size major mode) and biological factors (bioturbation and utilization of organic material) with a SPI/PV system. It is expected that the epibenthic community that colonizes the WTG foundations and OCS-DC

jacket will supply organic matter to the sediments below through filtration, biodeposition, and general deposition of detrital biomass. This organic material sourced from the biological activity of the epibenthic community on the wind structures will likely alter the infaunal community activity, increasing sediment oxygen demand and promoting the activity of deep-burrowing infauna. Based on benthic monitoring results in other offshore wind farms, the effects of the WTG foundation on the surrounding soft sediment habitat are expected to decrease with increasing distance from the WTG (as reviewed in Degraer et al. 2020).

Figure 15. Side-scan sonar data in an area of Sand and Muddy Sand at the SRW Project area, demonstrating high fishing activity as evidenced by numerous trawl marks across the sediment surface.

4.5.2.1 Technical Approach – Sediment profile and plan view imaging (SPI/PV)

SPI/PV will be used as the monitoring approach for the soft sediment habitat surveys. The SPI and PV cameras are state-of-the-art monitoring tools that capture benthic ecological functioning within the context of physical factors. The PV system captures high-resolution imagery over several meters of the seafloor, while the SPI system captures the typically unseen, sediment–water interface in the shallow seabed. SPI/PV provides an integrated, multi-dimensional view of the benthic and geological condition of seafloor sediments and will support characterization of the function of the benthic habitat, physical changes, and recovery from physical disturbance following the construction and during operation of SRWF and SRWEC-OCS. Additionally, PV data will be used to characterize surficial geological and biotic (epifaunal) features of hard-bottom areas within the sampling area but will not replace the dedicated novel hard bottom monitoring survey (Section 4.5.1). In addition to characteristics associated with site assessment and Coastal and Marine Ecological Classification Standard (CMECS) descriptors, the SPI/PV system will collect quantitative data on measurements associated with physical and biological changes related to

benthic function (bioturbation and utilization of organic material) that might result from construction and operation of SRWF and SRWEC-OCS. Details of these measurements are in Section 4.5.5.2 and are standard tools for assessing the response to disturbance and enrichment (Germano et al. 2011).

The SPI/PV imagery approach is more cost effective and comprehensive than benthic infaunal sampling approaches. Lower operating costs of SPI/PV collection compared to sediment grab sample collection and analysis, allows for greater spatial resolution with a higher density of stations. In addition, SPI/PV imagery documents aspects of the sediment architecture that is entirely missed during benthic infaunal sample collection. This spatial and contextual information, such as oxygen penetration depths (apparent redox potential discontinuity [aRPD] depth), infaunal bioturbation depths, and small-scale grain size vertical layering are critical pieces to assessing the ecological functioning of soft sediment habitats. Specifically, ecological functions related to organic matter processing, secondary production, and the forage-value of the benthic community are of particular importance when assessing impacts of OSW development on soft sediment habitats. Taxonomic analysis of sediment grab samples provides information on the benthic community composition (specifically, which species are there) and infaunal abundances at any given location and time. But, without making substantial inferences to relate presence and species counts to activity, the sediment grab approach is severely limited in its ability to assess impacts of offshore wind development on soft sediment functioning. Further, given the inherently dynamic and patchy nature of infaunal populations, benthic community count data generally requires extensive replication, substantial transformations for normalization, and overextending inferences to relate species composition to function. SPI/PV imagery provides an effective snapshot of the overall ecological health and condition of the sediments as reflected and integrated over time and space by the continuous activity of the infaunal and epifaunal communities present (Germano et al. 2011). It is this holistic community activity, not necessarily the identity of community members, that requires careful assessment to determine impacts of OSW on soft sediment habitats.

4.5.2.2 Survey Design

The soft bottom habitat monitoring will be conducted using a Before After Gradient (BAG) survey design to determine the spatial scale of potential impacts on benthic habitats and biological communities at the SRWF and along the SRWEC (Section 4.5.2.2). A separate benthic monitoring survey for the SRWEC-NYS will be conducted within NYS waters, which is presented in a separate monitoring plan (INSPIRE Environmental in prep.). At the SRWF, a single benthic survey will be conducted in late summer or early fall (August to October) six months prior to the start of seabed preparation for construction to document benthic habitats prior to disturbance. Along the SRWEC-OCS, the benthic habitats are already documented in sufficient detail, and no additional pre-construction benthic monitoring will be conducted. Subsequent surveys will be conducted in the same seasonal time frame at time intervals of 1, 2, 3, and 5 years after construction (Table 11). Sampling will occur during late summer or early fall to capture peak biomass and diversity of benthic organisms in alignment with previous studies (Deepwater Wind South Fork 2020; HDR 2020; NYSERDA 2017; Stokesbury 2013, 2014; LaFrance et al. 2010, 2014). Benthic habitats in the northwest Atlantic are generally stable with little seasonality in the absence of physical disturbance or organic enrichment (Steimle 1982; Reid et al. 1991; Theroux and Wigley 1998; HDR 2020). Further details on the survey designs associated with the sampling at the base of the WTGs and along the SRWEC are provided in Section 4.5.2.2, respectively.

Sampling Stations – WTG Foundation Bases (SRWF)

This survey is designed to investigate the hypothesis that colonization by epifaunal filter feeders on the WTG foundations will result in changes to the surrounding soft bottom benthic habitat by supplying organic matter to the sediment through filtration, biodeposition, and general deposition of detrital material. Enrichment of soft bottom habitats from the artificial reef effect will lead to fining and higher organic

content of surrounding soft bottom habitats, which is expected to be most pronounced down current and weaker up current. It is expected that evidence of sediment enrichment will dissipate with distance from the WTG bases.

The objective for the soft bottom benthic survey at the base of the turbine foundations is to measure benthic community function and physical characteristics over time along a spatial gradient from the foundation. To accomplish this, a BAG survey design will be used for statistical evaluation of the spatial and temporal changes in the benthic habitat (Underwood 1994; Methratta 2020). Data will be collected before and after installation and operation of SRWF at stations oriented along a gradient from select WTG foundations (Figure 16). This BAG design is based on an understanding of the complexities of habitat distribution at SRWF (habitat mapping report results pending), and an analysis of benthic monitoring results from European wind farms and the RODEO study at BIWF (HDR 2020; Coates et al. 2014; Dannheim et al. 2019; Degraer et al. 2018; Lefaible et al. 2019; Lindeboom et al. 2011). The proposed BAG survey design eliminates the need for a reference area, as this design is focused on sampling along a spatial gradient within the area of interest rather than using a control location that may not be truly representative of the conditions within the area of interest (Methratta 2020). This design also allows for the examination of spatial variation within the wind farm and does not assume homogeneity across sampling stations (Methratta 2020).

The same WTG foundations selected for the novel surfaces survey (Section 4.5.1.2) will be selected for this soft sediment survey. Data on the mean currents near SRWF will be used to establish up current and down current transects extending from each selected WTG foundation. Two belt transects (25 m wide) of SPI/PV stations will be established, one up current and the other down current of the selected turbine locations (Figure 16). Pre-construction transects will begin at the center point of the planned foundation with two stations at equal intervals up to the maximum planned extent of the scour protection area (30 m) and then at intervals of 0-10 m, 15-25 m, 40-50 m, 90-100 m, 190-200 m, and 900 m extending outward from the edge of the scour protection area (i.e., a single station at each of eight distance intervals in two directions from each turbine sampled; Figure 16). Post-construction transects will repeat this design at the same turbines and the same sampling distance intervals. These distances were chosen based on recent research indicating that effects of turbines on the benthic environment occur on a local scale (e.g., Lindeboom et al. 2011; Coates et al. 2014; Degraer et al. 2018; HDR 2019). In the Belgian part of the North Sea, gradient sampling of benthic habitat within wind farms was conducted at close stations and far stations that were up to 500 m away from the turbine foundations (Lefaible et al. 2019). However, recent data from Belgium indicates some level of enrichment has been recorded between 200-250 m from the turbines after eight years (personal comm. S. Degraer, 4/29/2020).

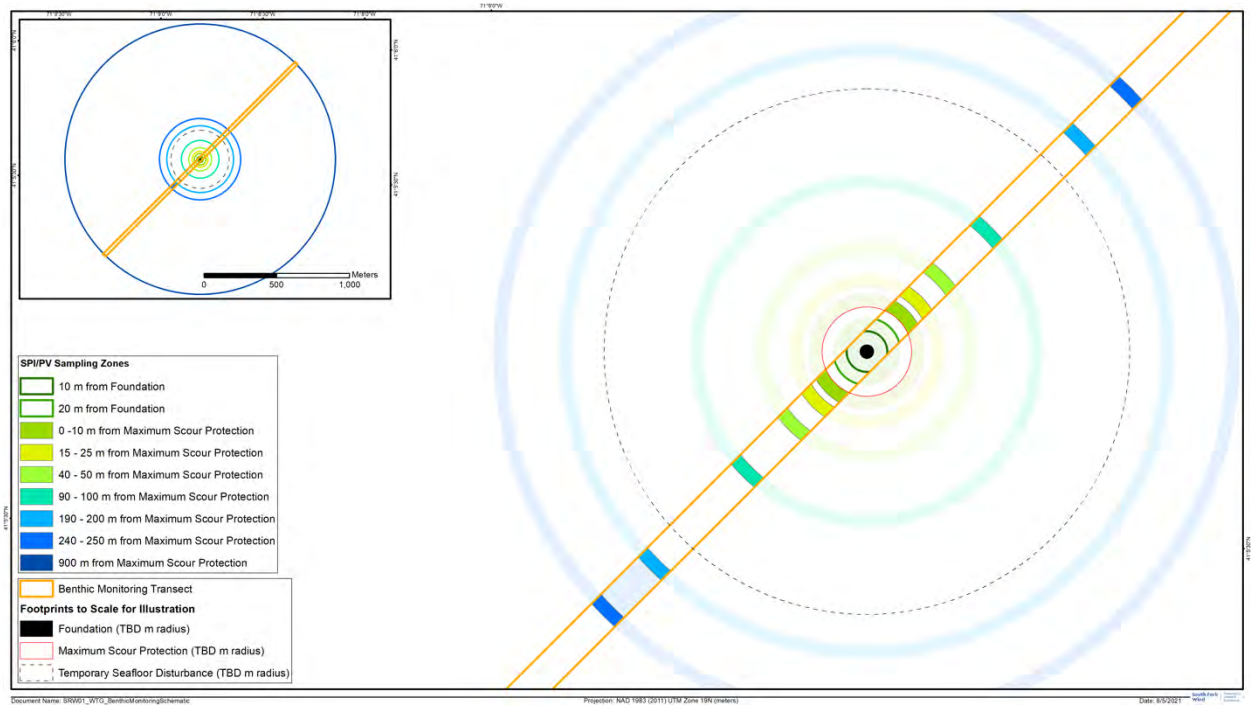


Figure 16. Proposed soft bottom benthic survey sampling design at a wind turbine foundation, the exact radius for scour protection is subject to change. See Section 1.2.2.1 for more details

Sampling Stations – Export Cable (SRWEC-OCS)

The objective for the soft bottom benthic survey along the SRWEC-OCS is to examine the effects of installation and operation of an export cable on the benthic habitat over time and along a spatial gradient with distance from the cable centerline. The primary effect of cable installation in the corridor is physical disturbance of the sediment with sediment resuspension and temporary loss of infauna. Effects of installation and operation of the cable are expected to be roughly equivalent along the length of the cable within similar benthic habitat types and within areas that experience similar levels of fishing activity. Some effects associated with the installation may be altered by dredging or trawling activities as well as bottom sediment transport from tides and waves. The sampling design is intended to estimate effects along a spatial gradient away from the cable and will not estimate mean changes along the entire SRWEC route. Any potential impacts of the cable on soft bottom habitats are expected to decrease over time since installation and with distance from the SRWEC-OCS centerline.

To accomplish the goals of this survey, SPI/PV data will be collected after installation and during operation of the SRWEC at selected locations, using a BAG design, like that proposed for the soft sediments around the turbine foundations (Section 4.5.2.2) (Underwood 1994; Methratta 2020). The benthic habitats along the SRWEC are already documented in sufficient detail, and no additional pre-construction benthic monitoring will be conducted. Details describing the BAG design approach and its value in evaluating potential temporal and spatial changes following construction are provided in the section above (Section 4.5.2.2).

The soft bottom survey sample design will focus on sampling at representative sections of the SRWEC-OCS based on mapped habitat types as informed by the habitat mapping report as well as reported fishing activity using VMS data (2015-2016 or the most recent available data). Although benthic habitat mapping is not yet finalized, it is expected that there will be a maximum of three predominant benthic habitat types

along the route (Figure 14). Fishing activity along the SRWEC will be grouped into two broad categories: high and low density of fishing activity (Figure 17). Sampling strata will be selected to include, to the extent possible, each benthic habitat type within each category of fishing activity (3 habitat types x 2 levels of fishing). At triplicate locations (each approximately 1 km apart) within each sampling stratum, a 25 m wide belt transect will be laid perpendicular to the cable route (Figure 17). Along each transect, a total of 16 stations will be sampled. Near the centerline these stations will be distributed roughly 10 m apart and the distance intervals between stations will increase with distance from the centerline (Figure 17). The selected sampling locations and sampling intervals relative to the cable will remain fixed for the duration of the surveys. More details of habitat distribution will be provided after the habitat mapping report results are completed.

Sampling along the SRWEC will occur within the first calendar year post installation (Y0) and at year 1 and year 2 during operation. After year 2, if benthic function measured with SPI/PV is indistinguishable from baseline conditions, and no difference is observed with distance from cable centerline, no further monitoring will occur. Alternatively, if benthic function is impaired (aRPD and or successional stage) and differences along the SRWEC-OCS persist compared with baseline and with distance from cable centerline, monitoring will continue at defined intervals until the benthos resemble baseline conditions or are no longer impaired (up to a maximum of five years of monitoring). Specific metrics that will be obtained from SPI/PV to assess benthic function are described in more detail in Section 4.5.5.2. An additional benthic survey of the SRWEC-NYS will be conducted within NYS waters, which is presented in a separate monitoring plan (INSPIRE Environmental in prep.).

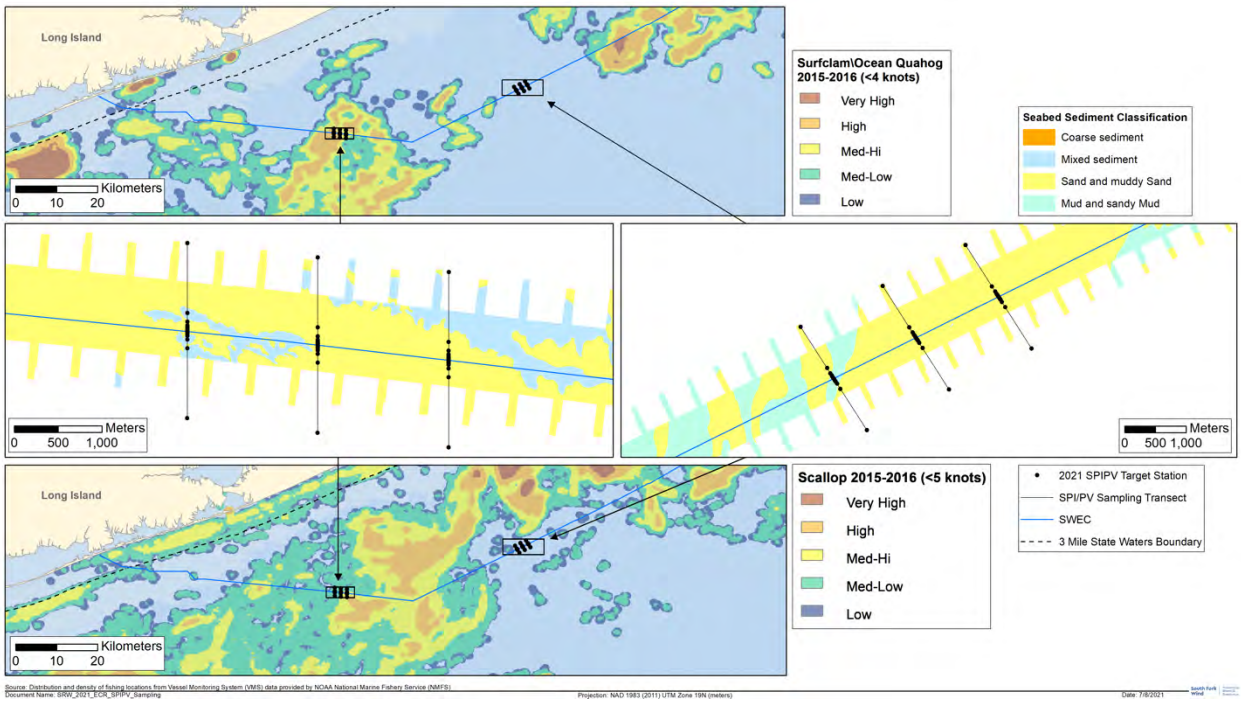


Figure 17. Proposed soft bottom benthic survey sampling design along the SRWEC with black dots indicating SPI/PV stations situated along triplicate transects perpendicular to the SRWEC within an area of high bivalve fishing intensity and an area of low bivalve fishing intensity. See Section 4.4.2.2 for more details.

4.5.3 Overview of Field Methods

The Field Lead Scientist will ensure that data are collected according to the established protocols and that all forms, checklists, field measurements, and instrument calibrations are recorded correctly during field sampling. For-hire vessels will be selected based on criteria including survey suitability, experience, safety record, knowledge of the area, and cost. All survey activities will be conducted with strict adherence to Orsted health and safety protocols to reduce the potential for environmental damage or injury.

Accurate vessel heading and differential position accuracy within a meter will be achieved using a V102 Hemisphere vector antenna (or equivalent) on the vessel. During mobilization, the navigator will conduct a positional accuracy check on the antenna by placing the antenna on a known GPS point and ensuring the antenna's position falls within a meter of the known coordinates. During operations, HYPACK Ultralite software will receive positional data from the antenna in order to direct the vessel to sampling stations.

4.5.3.1 Video Collection

High resolution video and still images will be acquired at targeted hard bottom areas and turbine foundations with a compact ROV comparable to a Seatronics Valor ROV (https://geo-matching.com/rovs-remotely-operated-underwater-vehicles/valor). The positioning components of the ROV would include a surface differential positioning system, an Ultra Short Baseline (USBL), as well as ROV-mounted motion and depth sensors. The USBL transceiver will communicate with geophysical beacons mounted onto the ROV allowing for the vehicle's depth and angle in relation to the transceiver to be known. Adding in the motion and depth sensors on the ROV, all this information will be connected into the ROV navigation software simultaneously tracking both the vessel's position and the ROV's position accurately.

In addition to accurate ROV positioning components, the vehicle will be equipped with powerful thrusters in both horizontal and vertical directions, creating confidence for operating in areas with higher currents. The vehicle will also be equipped with several pilot aids including, auto heading, auto depth, and auto hover. Using these tools, the ROV cameras can focus on any specifically selected habitat features during the survey allowing for better visual observations by scientists.

The ROV will supply live video feed to the surface using high definition (HD) video and ultra-high definition (UHD) still cameras. One pair of cameras will be downward facing to observe and capture high resolution images of seafloor surface conditions while another pair will face forward to collect data on vertical surfaces and avoid collisions. High lumen light-emitting diode (LED) lights will be mounted onto the ROV frame to increase visibility and aid in species identification. With sufficient lighting the images transferred to the surface will be clear, allowing for real time observations and adaptive sampling. The recorded video will be transferred to the surface through the ROV's umbilical and recorded using a Digital SubSea Edge digital video recorder (DVR) video inspection system (or equivalent). The system will provide simultaneous recording of both high-definition cameras as well as the ability to add specific transect data overlays during operations. The data overlay will include ROV position, heading, depth, date and time as well as field observations.

High resolution underwater imagery can provide preliminary information about the identity of encrusting fauna, including non-native organisms (Figure 18). However, because some species, such as ***Didemnum vexillum,*** require microscopic investigation to accurately identify, samples will be collected to confirm species identified in the still images. The ROV will contain a manipulator arm and basket to collect voucher specimens of encrusting species to ensure accurate identification. The option to collect a specimen sample for identification, will be made by the chief scientist, who will be familiar with the potential non-native organisms in the area. The chief scientist will consult the National Estuarine and Marine Exotic

Species Information System, a database maintained by the Smithsonian Environmental Research Center, when determining the need for a voucher specimen.

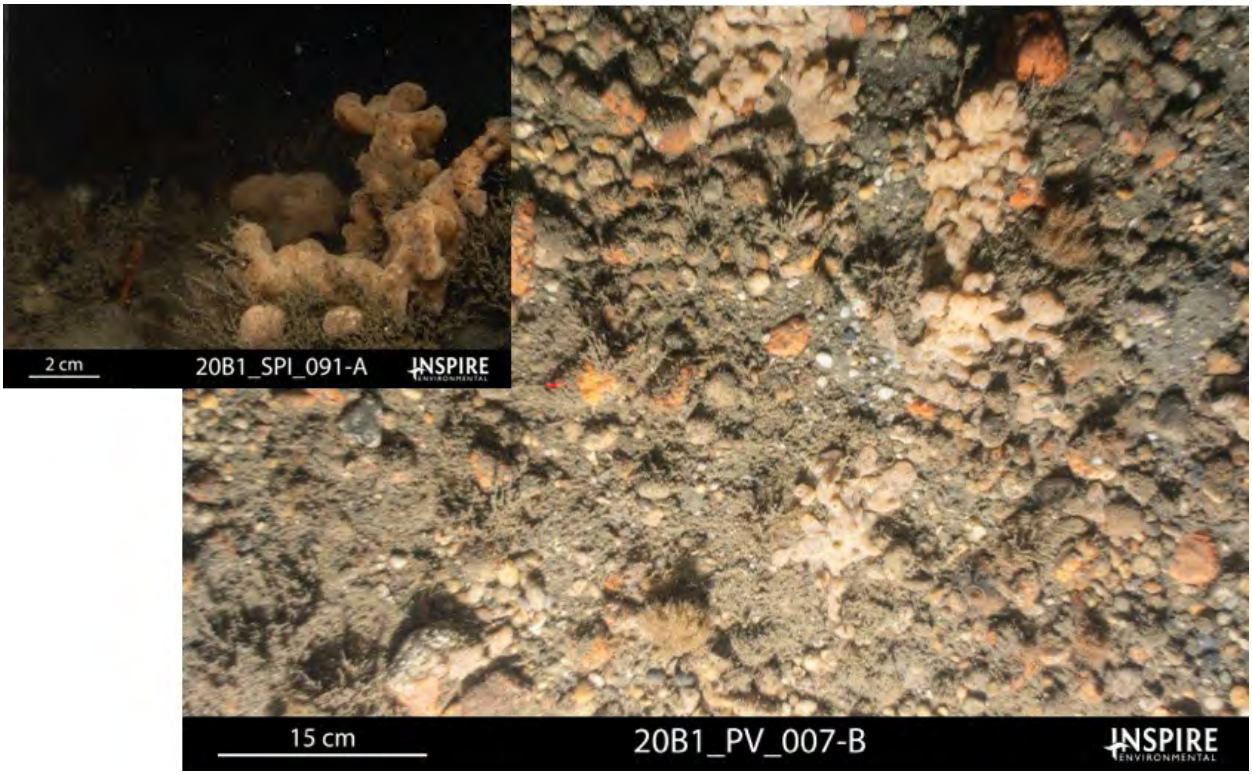


Figure 18. Examples of high-resolution SPI and PV imagery of an encrusting organism that is potentially *D. vexillum*, a non-native colonial tunicate; these images were not collected within the SRW Project area

4.5.3.2 Sediment Profile and Plan View Image Collection

By combining SPI and PV paired imagery, the SPI/PV sampling approach allows for the assessment of benthic functioning over a spatial scale of several square meters at each station. PV images provide a larger field-of-view than SPI images, or sediment grab samples, and provide valuable information about the landscape ecology and sediment topography in the area where the pinpoint “optical core” of the SPI is taken. Distinct surface sediment layers, textures, or structures detected in SPI can be interpreted considering the larger context of surface sediment features captured in the PV images. The scale information provided by the underwater lasers allows for accurate organismal density counts and/or percent cover of attached epifaunal colonies, sediment burrow openings, larger macrofauna and/or fish which are missed in the SPI cross section. A field of view is calculated for each PV image and measurements are taken of specific parameters outlined in the survey workplan.

The SPI/PV surveys associated with the soft bottom monitoring components (at the SRWF and along the SRWEC) will be conducted from research vessel(s) with scientists onboard to collect images utilizing a SPI/PV camera system. Collecting seafloor imagery does not require disturbance of the seafloor or collection of physical samples. Once the vessel is within a five-meter radius of the target location, the SPI/PV camera system will be deployed to the seafloor. As soon as the camera system contacts the seafloor the navigator will record the time and position of the camera electronically in HYPACK as well as the written field log. This process will be repeated for the targeted number of SPI/PV replicates per

sampling station. Results from the targeted number of replicates with suitable quality images will be aggregated to provide a summary value for each metric by station (mean, median, or maximum depending on the metric, see Section 4.5.5.2). After all stations have been surveyed the navigator will export all recorded positional data into a Microsoft Excel© spreadsheet. The Excel sheet will include the station name, replicate number, date, time, depth, and position of every SPI/PV replicate.

Acquisition and quality assurance/quality control of high-resolution SPI images will be accomplished using a Nikon D7100 or D7200 digital single-lens reflex (DSLR) camera with a 24.1-megapixel image sensor mounted inside an Ocean Imaging Model 3731 pressure housing system. An Ocean Imaging Model DSC PV underwater camera system, using a Nikon D7100 or D7200 DSLR, will be attached to the SPI camera frame and used to collect PV photographs of the seafloor surface at the location where the SPI images are collected. The PV camera housing will be outfitted with two Ocean Imaging Systems Model 400 37 scaling lasers. Co-located SPI and PV images will be collected during each “drop” of the system. The ability of the PV system to collect usable images is dependent on the clarity of the water column, while the ability of the SPI system to collect usable images is dependent upon the penetration of the prism.

4.5.4 Data Entry and Reporting

Data management and traceability is integral to analysis and accurate reporting. The surveys will follow a rigorous system to inspect data throughout all stages of collection and analysis to provide a high level of confidence in the data being reported. Following data entry, all digital logs will be proofread using the original handwritten field log. This review will be performed by someone other than the data entry specialist.

SPI and PV image QC checks include comparison of date/time stamps embedded in the metadata of every SPI and PV image to the field log and navigation times to ensure that all images are assigned to the correct stations and replicates. Computer-aided analysis of SPI/PV images will be conducted to provide a set of standard measurements to allow comparisons among different locations and surveys. Measured parameters for SPI and PV images will be recorded in Microsoft Excel© spreadsheets. These data will be subsequently checked by senior scientists as an independent quality assurance/quality control review before final interpretation. Spatial distributions of SPI/PV parameters will be mapped using ArcGIS.

During field operations, daily progress reports will be reported through whatever means are available (email, text, phone). Upon completion of the survey all analyzed images as well as a data report with visualizations will be provided. Options for optimal data sharing including images, video, and analysis results will be considered and determined at a future date. Possible delivery methods include an Azure database, a secure fileshare, and/or an interactive popup map. Interactive popup maps allow users to explore still and video imagery concurrent with geophysical data, project-specific boundaries and locations (e.g., WTGs, IAC), and interpretative data obtained from the imagery (e.g., presence of non-native taxa).

4.5.5 Data Analysis

4.5.5.1 Hard Bottom Video Imagery

Video imagery will be reviewed during acquisition and observations will be logged to document species and geological features for each video transect. An experienced video analyst will view logs, photos and videos and confirm or add annotations. The video system will have the capability of taking still images from all the input video signals to document features of interest.

For the turbine foundation and cable protection surveys (Section 4.5.1), the focus of the analysis will be biological features (e.g., percent cover of encrusting epifauna), identifying any non-native organisms,

identifying the key epifauna inhabiting the novel substrate, and quantifying the biomass of the dominant members of the epifaunal communities. Biomass estimation will be achieved through photogrammetry methodology as described in Section 4.5.1.1. Video from the ROV will provide quantitative details of habitat characteristics and quality, including categorical levels for the presence of fish and decapods, presence of refuge and surrounding substrata (sediment type), and the percent cover of emergent fauna.

4.5.5.2 Soft Bottom Sediment Profile and Plan View Imagery

Seafloor geological and biogenic substrates captured in SPI/PV imagery will be described using the Coastal and Marine Ecological Standard (CMECS; FGDC 2012), in particular the Substrate and Biotic CMECS metrics. Replicate images taken at each station will be summarized to a single value per analytical metric per station (e.g., predominant CMECS Substrate Subgroup, maximum infaunal successional stage, maximum and median feeding void depth, and mean aRPD depths). Measurement and interpretation of these indicators are presented in previous benthic assessment reports for SRW (INSPIRE Environmental 2021c, 2021d). Additionally, the benthic macrohabitat (***sensu*** Greene et al. 2007) types gleaned from the SPI/PV imagery of the Project area will be described. Differences in abiotic and biotic composition of macrohabitats will be compared between pre- and post-construction surveys. In particular, species composition and total percent cover of attached fauna on the scour mat and changes in benthic community with distance from the scour protection layer will be evaluated.

SPI/PV provides a more holistic assessment of benthic functioning that captures the relationship between infauna and sediments compared with infaunal abundance assessments using sediment grab sampling (Germano et al. 2011; see Section 4.4.2.1). Although infaunal abundance and density measurements are not generated from SPI/PV analysis, other metrics that will be collected as part of the benthic biological assessment include lists of infaunal and epifaunal species, the percent cover of attached biota visible in PV images, presence of sensitive and non-native species, and the infaunal successional stage (Pearson and Rosenberg 1978; Rhoads and Germano 1982; Rhoads and Boyer 1982).

Indicators of benthic function (bioturbation and utilization of organic material) include infaunal succession stage, feeding voids, methane, ***Beggiatoa*** and the depth of apparent redox potential discontinuity (aRPD depth). Of these, the successional stage and aRPD depth have the strongest predictive power for benthic functional response to physical disturbance and organic enrichment (Germano et al. 2011) and will be the key metrics used during the soft bottom surveys.

Infaunal successional stage describes the biological status of a benthic community and is useful in quantifying the biological recovery after a disturbance. Organism–sediment interactions in fine-grained sediments follow a predictable sequence of development after a major disturbance (Pearson and Rosenberg 1978; Rhoads and Germano 1982; Rhoads and Boyer 1982). This continuum is divided subjectively into four stages: Stage 0, indicative of a sediment column that is largely devoid of macrofauna, occurs immediately following a physical disturbance or in close proximity to an organic enrichment source; Stage 1 is the initial recolonizing by tiny, densely populated polychaete assemblages; Stage 2 is the start of the transition to head-down deposit feeders; and Stage 3 is the mature, equilibrium community of deep-dwelling, head-down deposit feeders. The presence of feeding voids in the sediment column is evidence of an active Stage 3 community. If the level of organic enrichment exceeds the capacity of the benthic community to consume the deposits the successional stage will revert to Stage 1, aRPD depths will be visible but very shallow, and eventually methane and ***Beggiatoa*** will appear as diagnostic conditions of organic over enrichment (Germano et al. 2011).

The aRPD depth is a measure of the depth within the sediment column where dissolved oxygen concentrations are depleted. This depth is dependent on several factors but is largely determined by the

amount of organic matter load to the sediments (organic matter decomposition consumes oxygen) and the amount of bioturbation by macrofaunal organisms (bioturbation mixes oxygen from surface waters deep into the sediments). With SPI analysis, the aRPD depth is described as “apparent” because of the potential discrepancy between where the sediment color shifts and the complete depletion of dissolved oxygen concentration occurs. In sandy sediments that have very low sediment oxygen demand (SOD), the sediment may lack a visibly reduced layer even if a redox potential discontinuity (RPD) is present. Because the determination of the aRPD requires distinction of optical contrast between oxidized and reduced particles, it is difficult, if not impossible, to determine the depth of the aRPD in well-sorted sands of any size that have little to no silt or organic matter in them. When using SPI technology on sand bottoms, estimates of the mean aRPD depths are often indeterminate with conventional white light photography. It is expected that as sediments surrounding the WTGs will increase in organic enrichment and fines, the aRPD will become more ‘apparent’ and provide a quantitative measure of enrichment. The aRPD has been shown to be a sensitive and specific indicator of hypoxic conditions experienced over the preceding 1 day to 4 weeks (Shumchenia and King 2010), and to be correlated to concurrent ***in situ*** dissolved oxygen concentrations (Sturdivant et al. 2012).

4.5.6 Statistical Analyses

The planned statistical analyses are summarized by survey type in Table 12.

For the novel hard bottom datasets (stratified random sampling design), the influence of depth and habitat type on benthic colonization will be explored using the 90% confidence interval for select metrics gleaned from the video footage (Table 12). The biological features obtained from the video footage will focus on characteristics that reflect habitat quality including the relative abundance of native versus non-native taxa present, and the biomass of epifauna. Growth of macrobiotic cover will be summarized for each sampling frame from observations taken with the ROV video. The metrics that will be assessed for each sampling frame include mean macrobiotic cover and relative abundance of native vs. non-native species and species composition (identified to the LPIL). Additional exploratory graphical displays will be used to visualize and describe spatial and temporal patterns in the data.

For the soft bottom datasets (BAG design at the base of the turbines and at selected locations along the SRWEC), data analysis will include exploratory multivariate approaches (e.g., nMDS) to identify patterns among responses (SPI/PV metrics, e.g., aRPD, successional stage, feeding voids, presence of methane or ***Beggiatoa***) and predictors (e.g., quantitative or categorical epifaunal/epifloral cover estimates on the turbine foundations; and distance from the turbine). Covariates in the model for the turbine foundation dataset will include habitat type (categorical) and direction (categorical); variability among turbines will provide site-wide random error. For individual metrics that are consistently measured across stations (e.g., aRPD), parametric or non-parametric regression (e.g., generalized modeling such as GLM or GAM; or regression trees) will be applied if the data prove to be sufficient and appropriate for these tools. Additionally, graphical methods and descriptive statistics will be used to assess changes in the SPI/PV metrics over time and as a function of distance and direction from the turbines. These graphical techniques may help to elucidate the spatial scale at which the greatest changes in benthic habitat quality occur.

Survey Methods

Table 12. Summary of Planned Statistical Analyses for the Benthic Monitoring Surveys at SRWF

Survey	Report Section	Area	Design Type	Design Overview	Design details	Metrics of Interest	Research Question	Post-Construction Statistical Methods
Impact Analyses								
Novel Surfaces Surveys	4.5.1.2	SRWF	SS	WTG foundations; random samples stratified by habitat type; single season. OCS-DC foundation will also be sampled	**Sampling frame =** turbines with mobile sediment classes **Observational unit** = imaged quadrat (at systematically sampled intervals within frame) **Response variable** = macrobiotic cover, relative abundance of native vs non-native. **Error variance** = among samples within same area	**ROV**: cover (macrobiota, relative abundance of native vs. invasive).	What is the magnitude of difference in mean response with elevation (WTG foundation) and across habitat type at each survey event?	Estimate 90% CI on the difference of means for discrete depth intervals and WTG's blocked by habitat type, at each survey event. Compare the temporal profiles between depths and WTGs by habitat type
		SRWEC-OCS	SS	Cable Protection; random samples stratified by habitat type; single season.	**Sampling frame =** cable protection areas with mobile sediment classes **Observational unit** = imaged quadrat (at systematically sampled intervals within frame) **Response variable** = macrobiotic cover, relative abundance of native vs non-native. **Error variance** = among samples within same area	**ROV**: cover (macrobiota, relative abundance of native vs. invasive).	What is the magnitude of difference in mean response with habitat type, at each survey event?	Estimate 90% CI on the difference of means for cable protection blocked by habitat type, at each survey event. Compare the tempora profiles between cable protection areas by habitat type
Soft Bottom Surveys	4.5.2.2	SRWF	BAG	Impact only (no reference sites); stns at distances ranging from ~10 m to ~900 m from turbines; 2 directions from each turbine along prevailing current; single season	**Sampling frame** = turbines with mobile sediment classes up/down current **Observational unit** = SPI/PV station (turbines randomized first survey event, then fixed throughout study; stations randomized every survey; replicate images are subsamples) **Response variable** = mean or max per station depending on metric. **Error variance** = among stations at the same distance-direction (turbines provide replication)	**SPI**: aRPD, Successional Stage, penetration, methane, ***Beggiatoa*** **PV**: cover (macrobiota, shells, cobble), presence/absence of sensitive or invasive species	What is the pattern of temporal change in metrics relative to direction and/or distance from turbine?	Fit a parametric generalized model (e.g., GLM, GLMM or GAM) or non-parametric regression tree that best describes the data. Compare the temporal profiles across spatial gradients. Calculate similarity between stations; graphically depict relationships between stations from different years, directions, or distances with nMDS.
		SRWEC-OCS	BAG	Impact only (no reference sites); stns at distances ranging from ~5 m to ~1 km from cable; ≥ 3 transects within each habitat stratum.	**Sampling frame** = soft bottom areas of SRWEC-OCS **Observational unit** = SPI/PV station (transects randomized first survey event, then fixed throughout study; stations randomized every survey; replicate images are subsamples) **Response variable** = mean or max per station depending on metric. **Error variance** = among stations at the same distance-direction (transects provide replication)	**SPI**: aRPD, Successional Stage, penetration, methane, ***Beggiatoa*** **PV**: cover (macrobiota, shells, cobble), presence/absence of sensitive or invasive species,	What is the pattern of temporal change in metrics relative to distance from export cable?	Fit a parametric generalized model (e.g., GLM, GLMM or GAM) or non-parametric regression tree that best describes the data. Compare the temporal profiles across spatial gradients. Calculate similarity between stations; graphically depict relationships between stations from different years, directions, or distances with nMDS.

Definitions:
BAG = before after gradient
90% CI = 90% confidence interval
nMDS = non-parametric Multidimensional Scaling
SS = Systematic (random) sampling

5.0 REFERENCES

Anderson, J.M. 2018. Perception & Use of Magnetic Field Information in Navigation Behaviors in Elasmobranch Fishes (Doctoral dissertation, University of Hawai'i at Mānoa).

Atlantic Coastal Cooperative Statistics Program (ACCSP). 2020a. Data Warehouse, Non-Confidential Commercial Landings (2009-2018), Summary; using Data Warehouse [online application], Arlington, VA: Available at https://www.accsp.org; Public Data Warehouse; accessed (February 2020).

Atlantic Coastal Cooperative Statistics Program (ACCSP). 2020b. Commercial landing data processed by Atlantic Coastal Cooperative Statistics Program, provided to INSPIRE Environmental, April 2020.

Atlantic Coastal Cooperative Statistics Program (ACCSP). 2020c. Commercial landing data processed by Atlantic Coastal Cooperative Statistics Program, provided to INSPIRE Environmental, May 2020.

Atlantic States Marine Fisheries Commission (ASMFC). 2019. 2019 Horseshoe crab benchmark stock assessment and peer review report. May 1, 2019. 316 pp.

Bethoney, N.D. and K.D.E. Stokesbury. 2018. Methods for Image-based Surveys of Benthic Macroinvertebrates and Their Habitat Exemplified by the Drop Camera Survey for the Atlantic Sea Scallop. J Vis Exp. 2018; (137): 57493.

Bigelow, H.B. and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish Wildl. Serv., Fish. Bull. 74: 1-577.

Bonzek, C.F., J. Gartland, R.A. Johnson, and J.D. Lange Jr. 2008. NEAMAP Near Shore Trawl Survey: Peer Review Documentation. A report to the Atlantic States Marine Fisheries Commission.

Bonzek, C.F., J. Gartland, D.J. Gauthier, and R.J. Latour. 2017 Northeast Area Monitoring and Assessment Program (NEAMAP) Data collection and analysis in support of single and multispecies stock assessments in the Mid- Atlantic: Northeast Area Monitoring and Assessment Program Near Shore Trawl Survey. Virginia Institute of Marine Science, College of William and Mary. https://doi.org/10.25773/ 7206-KM61.

Bouma S. and W. Lengkeek. 2012. Benthic communities on hard substrates of the offshore wind farm Egmond aan Zee (OWEZ). Bureau Waardenburg bv. Consultants for environment & ecology, Culemborg, The Netherlands, 84 pp.

Brousseau, L.J., Sclafani, M., Smith, D.R., and Carter, D.B. 2004. Acoustic-tracking and radio-tracking of horseshoe crabs to assess spawning behavior and subtidal habitat use in Delaware Bay, North American Journal of Fisheries Management, 24: 1376-1384.

Buckel, J.A., D.O. Conover, N.D. Steinberg, and K.A. McKown. 1999. Impact of age-0 bluefish (***Pomatomus saltatrix***) predation on age-0 fishes in the Hudson River estuary: evidence for density dependent loss of juvenile striped bass (***Morone saxatilis***). Canadian Journal of Fisheries and Aquatic Science, 56:275-287.

References

Bureau of Ocean Energy Management (BOEM). 2019. Guidelines for providing information on fisheries for renewable energy development on the Atlantic outer continental shelf pursuant to 30 CFR Part 585. Office of Renewable Energy Programs. June 2019.

Burnett, J., L. O'Brien, R.K. Mayo, J.A. Darde, and M. Bohan. 1989. Finfish maturity sampling and classification schemes used during Northeast Fisheries Science Center Bottom Trawl Surveys, 1963-89. NOAA technical Memorandum MNFS-F/NEC-76. 16 pp.

Cadrin, S.X., A. Barkley, G. DeCelles, and S. Follet. 2013a. An industry-based survey for yellowtail flounder in southern New England. Final Report Submitted to Commercial Fisheries Research Foundation. NOAA Award Numbers: NA09NMF4720414/NA10NMF4720285. 44 pp.

Cadrin, S.X., G. DeCelles, S. Roman, E. Barlow, N. Pearsall, and J. Jordan. 2013b. An industry-based survey for winter flounder in southern New England. Final Report Submitted to Commercial Fisheries Research Foundation. NOAA Award Numbers: NA09NMF4720414/NA10NMF4720285. 47 pp.

Cadrin, S.X., D.R. Zemeckis, M.J. Dean, and J. Cournane. 2020. Chapter 7. Applied Markers. In: An Interdisciplinary Assessment of Atlantic Cod (***Gadus morhua***) Stock Structure in the Western Atlantic Ocean (McBride, R.S., and R.K. Smedbol, eds.). NOAA Technical Memorandum (in press).

Carey, D.A., D.H. Wilber, L.B. Read, M.L. Guarinello, M. Griffin, and S. Sabo. 2020. Effects of the Block Island Wind Farm on coastal resources: lessons learned. Oceanography, 33(4): 36-47.

Chipps, S.R. and J.E. Garvey. 2006. Chapter 11: Assessment of Food Habits and Feeding Patterns. In: Analysis and Interpretation of Freshwater Fisheries Data (eds: C.S. Guy and M.L. Brown). American Fisheries Society. Bethesda, MD.

CoastalVision. 2013. Deepwater Wind Block Island Wind Farm Revised Draft Ventless Trap Survey Plan.

Coates, D.A., Y. Deschutter, M. Vincx, and J. Vanaverbeke. 2014. Enrichment and shifts in macrobenthic assemblages in an offshore wind farm area in the Belgian part of the North Sea. Marine Environmental Research, 95: 1–12.

Cohen, J. 1992. A power primer. Psychological Bulletin. 112: 155-159.

Collette, B.B. and G. Klein-MacPhee. 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine. Third Edition. Smithsonian Institution Press. Washington D.C. 748 pp.

Collie, J. and J. King. 2016. Spatial and temporal distributions of lobsters and crabs in the Rhode Island Massachusetts wind energy area. OCS Study BOEM 2016-073. 58 pp.

Dannheim, J., L. Bergström, S.N.R. Birchenough, R. Brzana, A.R. Boon, J.W.P. Coolen, J. Dauvin, I. De Mesel, J. Derweduwen, A.B. Gill, Z.L. Hutchison, A.C. Jackson, U. Janas, G. Martin, A. Raoux, J.Reubens, L. Rostin, J. Vanaverbeke, T.A. Wilding, D. Wilhelmsson, and S. Degraer. 2019. Benthic effects of offshore renewables: identification of knowledge gaps and urgently needed research. ICES Journal of Marine Science 77: 1092–1108.

References

De Mesel, I., F. Kerckhof, A. Norro, B. Rumes, and S. Degraer. 2015. Succession and seasonal dynamics of the epifauna community on offshore wind farm foundations and their role as stepping stones for non-indigenous species. Hydrobiologia, 756(37):37–50.

Dean, M., W.S. Hoffman, D.R. Zemeckis, and M.P. Armstrong. 2014. Fine-scale and gender-based patterns in behavior of Atlantic cod (***Gadus morhua***) on a spawning ground in the western Gulf of Maine. ICES Journal of Marine Science, 71(6): 1474-1489.

Dean, M., G. DeCelles, D. Zemeckis, and T. Ames. 2020. Chapter 2: Early Life History: Spawning to Settlement. In: An Interdisciplinary Review of Atlantic Cod (***Gadus morhua***) stock structure in the western North Atlantic Ocean (McBride, R.S., and R.K. Smedbol, eds.). NOAA Technical Memorandum. U.S. Department of Commerce. Woods Hole, MA.

Deepwater Wind South Fork 2020. South Fork Wind Research and Monitoring Plan. September 2020. Prepared by South Fork Wind, LLC and INSPIRE Environmental. 68pp.

Degraer, S., Brabant, R., Rumes, B., and Vigin, L. 2018. Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea: Assessing and Managing Effect Spheres of Influence. Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management, Brussels, Belgium. 136 pp.

Degraer, S., D.A. Carey, J.W.P. Coolen, Z.L. Hutchison, F. Kerckhof, B. Rumes, and J. Vanaverbeke. 2020. Offshore wind farm artificial reefs affect ecosystem structure and functioning: A synthesis. Oceanography 33(4):48–57, https://doi.org/10.5670/ oceanog.2020.405.

Drohan, A.F., J.P. Manderson, and D.B. Packer. 2007. Essential Fish Habitat Source Document: Black Sea Bass, ***Centropristis striata***, Life History and Habitat Characteristics. Second edition. NOAA Technical Memorandum NMFS-NE-200. 78 pp.

Ecology and Environment Engineering, P.C. 2017. New York State Offshore Wind Master Plan: Fish and Fisheries Study. NYSERDA Report 17-25l. 202 pp.

Exponent 2021. Sunrise Wind Farm Project Appendix J1 Offshore EMF Assessment. Revision 2 – December June 1, 2021. Prepared for Sunrise Wind. 108 pp.

Federal Geographic Data Committee (FGDC). 2012. Coastal and Marine Ecological Classification Standard. FGDC-STD-018-2012. Marine and Coastal Spatial Data Subcommittee. June 2012. 343 pp. Reston, VA.

Field, S.A., P.J. O'Connor, A. Tyre, and H.P. Possingham. 2007. Making monitoring meaningful. Austral Ecology, 32: 485-491.

Flescher, D.D. 1980. Guide to Some Trawl Caught Marine Fishes from Maine to Cape Hatteras, North Carolina. NOAA Technical Report NMFS Circular 431. March 1980.

Freiss, C., Lowerre-Barbieri, S.K., Poulakis, G., and 34 others. 2021. Regional-scale variability in movement ecology of marine fisheries revealed by an integrative acoustic tracking network. Marine Ecology Progress Series, 663: 157-177.

References

Friedland, K.D., E.T. Methratta, A.B. Gill, S.K. Gaichas, T.H. Curtis, E.M. Adams, J.L. Morano, D.P. Craer, M.C. McManus, and D.C. Brady. 2021. Resource occurrence and productivity in existing and proposed wind energy lease areas on the northeast US shelf. Frontiers in Marine Science, doi: 10.3389/fmars.2021.629230.

Galloway, B.J., and K.R. Munkittrick. 2006. Influence of seasonal changes in relative liver size, condition, relative gonad size and variability in ovarian development in multiple spawning fish species used in environmental monitoring programs. Journal of Fish Biology, 69(6): 1788-1806.

Germano, J.D., D.C. Rhoads, R.M. Valente, D. Carey, and M. Solan. 2011. The use of Sediment Profile Imaging (SPI) for environmental impact assessments and monitoring studies: Lessons learned from the past four decades. Oceanography and Marine Biology: An Annual Review 49: 247-310.

Greene, H.G., J.J. Bizzarro, V.M. O'Connell, C.K. Brylinksky. 2007. Construction of Digital Potential Marine Benthic Habitat Maps Using a Coded Classification Scheme and its Application. in Todd, B.J., and Greene, H.G., eds., Mapping the Seafloor for Habitat Characterization: Geological Association of Canada, Special Paper 47.

Greene, J.K., M.G. Anderson, J. Odell, and N. Steinberg, eds. 2010. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA.

Guida, V., A. Drohan, H. Welch, J. McHenry, D. Johnson, V. Kentner, J. Brink, D. Timmons, and E. Estela- Gomez. 2016. Habitat Mapping and Assessment of Northeast Wind Energy Areas. Sterling, VA: US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-088. 312 p.

Hart, D. 2015. Northeast Fisheries Science Center Scallop Dredge Surveys. Prepared for the Sea Scallop Survey Review, March 2015. Available online: https://www.cio.noaa.gov/services_programs/prplans/pdfs/ID321_Draft_Product_1-NEFSC_Dredge.pdf

HDR. 2019. Benthic Monitoring during Wind Turbine Installation and Operation at the Block Island Wind Farm, Rhode Island – Year 2. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2019-019. 318 pp.

HDR. 2020. Benthic and Epifaunal Monitoring During Wind Turbine Installation and Operation at the Block Island Wind Farm, Rhode Island – Project Report. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2020-044. Volume 1: 263 pp; Volume 2:380 pp.

He, P. and C. Rillahan. 2020. Vineyard Wind Demersal Trawl Survey: 2019/2020 Annual Report. 501 North Study Area. August 2020. Prepared for Vineyard Wind, LLC.

Hiscock, K., H. Tyler-Walters, and H. Jones. 2002. High Level Environmental Screening Study for Offshore Wind Farm Developments – Marine Habitats and Species Project. Report from the Marine Biological Association to The Department of Trade and Industry New & Renewable Energy Programme. (AEA Technology, Environment Contract: /35/00632/00/00.)

References

Hureau, J.C. 1969. Biologie comparee de quelques poissons anarctiques (Nototheniidae). Bulletin of the Institut Oceanographique Monaco 68:1í44.

Hussey, N.E., S.T. Kessel, K. Aarestrup, S.J. Cooke, P.D. Cowley, A.T. Fisk, R.G. Harcourt, K.N. Holland, S.J. Iverson, J.F. Kocik, and J.E.M. Flemming. 2015. Aquatic animal telemetry: a panoramic window into the underwater world. Science, 348(6240), p.1255642.

Hutchison Z., P. Sigray, H. He, A. Gill, J. King, and C. Gibson. 2018. Electromagnetic Field (EMF) Impacts on Elasmobranch (shark, rays, and skates) and American Lobster Movement and Migration from Direct Current Cables. Report by University of Rhode Island, Cranfield University, and FOI (Swedish Defense Research Agency).

Hutchison, Z.L., A.B. Gill, P. Sigray, H. He, and J.W. King. 2020a. Anthropogenic electromagnetic fields (EMF) influence the behaviour of bottom-dwelling marine species. Scientific Reports. 10(1):1-15.

Hutchison, Z.L., M. LaFrance Bartley, S. Degraer, P. English, A. Khan, J. Livermore, B. Rumes, and J.W. King. 2020b. Offshore wind energy and benthic habitat changes: Lessons from Block Island Wind Farm. Oceanography 33(4):58–69, https://doi.org/10.5670/oceanog.2020.406.

Ingram, E.C., R.M. Cerrato, K.J. Dunton, and M.G. Frisk. 2019. Endangered Atlantic Sturgeon in the New York Wind Energy Area: implications of future development in an offshore wind energy site. Scientific Reports, 9:12432

INSPIRE Environmental. 2021a. Commercial and Recreational Fisheries technical report. Sunrise Wind Farm Project. Technical report by INSPIRE Environmental prepared for Sunrise Wind, LLC. June 2021.

INSPIRE Environmental. 2021b. Block Island Wind Farm Demersal Fish Trawl Survey: Synthesis Report Years 1-7, October 2012 through September 2019. March 2021. Prepared for Deepwater Wind Block Island, LLC. 261 pp.

INSPIRE Environmental. 2021c. Benthic Resources Characterization Report – Federal Waters Sunrise Wind Farm Project. Prepared for Stantec and Sunrise Wind. June 2021.

INSPIRE Environmental. 2021d. Benthic Resources Characterization Report – New York State Waters Sunrise Wind Farm Project. Prepared for Stantec and Sunrise Wind. June 2021.

INSPIRE Environmental. In prep. Benthic Habitat Mapping to Support Essential Fish Habitat Consultation, Sunrise Wind Farm. Prepared for Sunrise Wind LLC.

INSPIRE Environmental. In prep. Sunrise Wind Benthic Monitoring Plan - New York State Waters. Prepared for Sunrise Wind.

Jacoby, D.M.P., E.J. Brooks, D.P. Croft, and D.W. Sims. 2012. Developing a deeper understanding of animal movements and spatial dynamics through novel application of network analyses. Methods in Ecology and Evolution, 3:574-583.

Jakob, E.M., S.D. Marshall, and G.W. Uetz. 1996. Estimating fitness: a comparison of body condition indices. Oikos, 77: 61-67.

References

Karama, K.S., Y. Matsushita, M. Inoue, K. Kojima, K. Tone, I. Nakamura, and R. Kawabe. 2020. Movement pattern of red seabream ***Pagrus major*** and yellowtail ***Seriola quinqueradiata*** around offshore wind turbines and the neighboring habitats near Goto Islands, Japan. Aquaculture and Fisheries, https://doi.org/10.1016/j.aaf.2020.04.005

Kavet, R., M.T. Wyman, A.P. Klimley, and X. Vergara. 2016. Assessment of potential impact of electromagnetic fields from undersea cable on migratory fish behavior. Electric Power Research Institute (EPRI) for the US Department of Energy and US Department of the Interior, Bureau of Ocean Energy Management.

Keller, A.B., N.F. Putman, R.D. Grubbs, D.S. Portnoy, and T.P. Murphy. 2021. Map-like use of Earth's magnetic field in sharks. Current Biology, DOI:https://doi.org/10.1016/j.cub.2021.03.103.

Kells, V. and K. Carpenter. 2011. A Field Guide to Coastal Fishes from Maine to Texas. Johns Hopkins University Press, 448 pp.

Kendall, A.W. 1977. Biological and fisheries data on black sea bass, ***Centropristis striata*** (Linnaeus). Sandy Hook Lab., Northeast Fish. Cent., Nat. Mar. Fish. Serv., NOAA Tech. Ser. Rep. 7: 1-29.

Klimley, A.P., M.T. Wyman, and T. Kaven. 2017. Chinook salmon and green sturgeon migrate through San Francisco estuary despite large distortions in the local magnetic field produced by bridges. PLoS ONE, 12(6): e0169031.

Kneebone, J. and C. Capizzano. 2020. A comprehensive assessment of baseline recreational fishing effort for highly migratory species in southern New England and the associated wind energy area. Final report submitted to Vineyard Wind LLC. May 4, 2020. Available online at: https://www.vineyardwind.com/fisheries-science.

Kraus, C. and L. Carter. 2018. Seabed recovery following protective burial of subsea cables – Observations from the continental margin. Ocean Engineering, 157: 251-261.

Krone, R., G. Dederer, P. Kanstinger, P. Krämer, and C. Schneider. 2017. Mobile demersal megafauna at common offshore wind turbine foundations in the German Bight (North Sea) two years after deployment - increased production rate of Cancer pagurus. Marine Environmental Research, 123:53–61, https://doi.org/10.1016/j.marenvres.2016.11.011.

LaFrance, M., King, J.W., Oakley, B.A. & Pratt, S. 2014. A comparison of top-down and bottom-up approaches to benthic habitat mapping to inform offshore wind energy development. Continental Shelf Research (2014). http://dx.doi.org/10.1016/j.cer.2014.007.

LaFrance, M., Shumchenia, E., King, J.W., Pockalny, R., Oakley, B. Pratt, S. & Boothroyd, J. 2010. Chapter 4. Benthic habitat distribution and subsurface geology in selected sites from the Rhode Island Ocean Special Area Management Study Area In: Rhode Island OCEAN SAMP. Volume 2. Coastal Resources Management Council, October 12, 2010.

Langhamer, O. 2012. Artificial reef effect in relation to offshore renewable energy conversion: State of the Art. The Scientific World Journal. doi:10.1100/2012/386713

Lefaible, N., L. Colson, U. Braeckman, and T. Moens. 2019. Evaluation of turbine-related impacts on macrobenthic communities within two offshore wind farms during the operational phase. In

References

Degraer, S., Brabant, R., Rumes, B. & Vigin, L. (eds). 2019. Environmental Impacts of Offshore Wind Farms in the Belgian Part of the North Sea: Marking a Decade of Monitoring, Research and Innovation. Brussels: Royal Belgian Institute of Natural Sciences, OD Natural Environment, Marine Ecology and Management, 134 p.

Lea, J.S.E., N.E. Humphries, R.G. von Brandis, C.R. Clarke, and D.W. Sims. 2016. Acoustic telemetry and network analysis reveal the space use of multiple reef predators and enhance marine protected area design. Proceedings of the Royal Society B, 283: 20160717.

Ledee, E.J.I., M.R. Heupel, A.J. Tobin, D.M. Knip, and C.A. Simpfendorfer. 2015. A comparison between traditional kernel-based methods and network analysis: an example from two nearshore shark species. Animal Behaviour, 103:17-28.

Lindeboom, H.J., H.J. Kouwenhoven, M.J.N. Bergman, S. Bouma, S. Brasseur, R. Daan, R.C. Fijn, et al. 2011. Short-term ecological effects of an offshore wind farm in the Dutch coastal zone; a compilation. Environmental Research Letters, 6: 1-13.

Lookingbill, T.R., R.H. Gardner, J.R. Ferrari, and C.E. Keller. 2010. Combining a dispersal model with network theory to assess habitat connectivity. Ecological Applications, 20:427-441.

Malek, A. 2015. An Investigation of the Fisheries Ecosystem Dynamics in Rhode Island's Nearshore Waters. Open Access Dissertations. Paper 352. https://digitalcommons.uri.edu/oa_diss/352

Massachusetts Division of Marine Fisheries (MADMF). 2018. Recommended regional scale studies related to fisheries in the Massachusetts and Rhode Island-Massachusetts offshore wind energy areas.

McCann, J. 2012. Developing Environmental Protocols and Modeling Tools to Support Ocean Renewable Energy and Stewardship. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA., OCS Study BOEM 2012-082, 626 pp.

Methratta, E. 2020. Monitoring fisheries resources at offshore wind farms: BACI vs. BAG designs. ICES Journal of Marine Science. doi:10.1093/icesjms/fsaa026.

National Marine Fisheries Service (NMFS). 2015. Regional habitat assessment prioritization for northeastern stocks. Report of the Northeast Regional Habitat Assessment Prioritization Working Group. Internal report, NMFS White Paper. Office of Science and Technology, NMFS, NOAA. Silver Spring, MD. 31 pp.

National Marine Fisheries Service (2021) Fisheries of the United States, 2019. U.S. Department of Commerce, NOAA Current Fishery Statistics No. 2019 Available at: https://www.fisheries.noaa.gov/national/sustainable-fisheries/ fisheries-united-states

References

National Oceanic and Atmospheric Administration (NOAA). 2019. 2018 Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species. Highly Migratory Species Management Division. Silver Spring, MD. 250 pp.

National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries). 2020. Vessel Trip Report (VTR) data processed by Northeast Fisheries Science Center Social Sciences Branch, provided to INSPIRE Environmental, March 2020.

National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries). 2021. Stock Condition. Retrieved from www.st.nmfs.noaa.gov/stocksmart. 03/17/2021.

Nelder, J.A. and R.W.M. Wedderburn. 1972. Generalized Linear Models. Journal of the Royal Statistical Society, Series A 135:370-384.

Nestler, E., A. Pembroke, and W. Bailey. 2010. Effects of EMFs from undersea power lines on marine species. Energy Ocean International, Ft. Lauderdale, FL.

Nelson, G.A. 2014. Cluster sampling; a pervasive, yet little recognized survey design in fisheries research. Transactions of the American Fisheries Society, 143(4): 926-938.

New York State Energy Research and Development Authority (NYSERDA). 2017. New York State Offshore Wind Master Plan: Fish and Fisheries Study. NYSERDA Report 17-25j. 140 pp.

Normandeau Associates, Exponent, T. Tricas, and A. Gill. 2011. Effects of EMFs from undersea power cables on elasmobranchs and other marine species. Final Report. OCS Study BOEMRE 2011-09. 426 pp.

Northeast Fisheries Science Center (NEFSC). 2010. 50th Northeast Regional Stock Assessment Workshop: Assessment Report. Northeast Fisheries Science Center Reference Document 10-17.

Northeast Fisheries Science Center (NEFSC). 2016. Fisheries Sampling Branch Observer On-Deck Reference Guide 2016. U.S. Department of Commerce, NOAA Fisheries Service. Woods Hole, MA.

Ouakka, K., A. Yahyaoui, A. Mesfioui, and S. El Ayoubi. 2017. Stomach fullness index and condition factor of European sardine (***Sardina pilchardus***) in the south Moroccan Atlantic coast. AACL Bioflux 10: 56-63.

Packer, D.B., S.J. Griesbach, P.L. Berrien, C.A. Zetlin, D.L. Johnson, and W.W. Morse. 1999. Essential fish habitat source document: summer flounder, ***Paralichthys dentatus***, life history and habitat characteristics. NOAA technical Memorandum NMFS-NE-151.

Pearson, T.H. and R. Rosenberg. 1978. Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. Oceanography and Marine Biology an Annual Review 16: 229–311.

Petersen, J.K., and Malm, T. 2009. Offshore wind farms: threats to or possibilities for the marine environment. Ambio, 35(2): 75-80.

References

Petruny-Parker, M., A. Malek, M. Long, D. Spencer, F. Mattera, E. Hasbrouck, J. Scotti, K. Gerbino, and J. Wilson. 2015. Identifying Information Needs and Approaches for Assessing Potential Impacts of Offshore Wind Farm Development on Fisheries Resources in the Northeast Region. US Dept. of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Herndon, VA. OCS Study BOEM 2015-037. 79 pp.

Politis, P.J., J.K. Galbraith, P. Kostovick, and R.W. Brown. 2014. Northeast Fisheries Science Center bottom trawl survey protocols for the NOAA Ship Henry B. Bigelow. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 14-06; 138 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026 or online at http://nefsc.noaa.gov/publications/

Reid, R.N., D.J. Radosh, A.B. Frame, and S.A. Fromm. 1991. Benthic macrofauna of the New York Bight, 1979-1989. NOAA Technical Report NMFS-103; 50 p.

Responsible Offshore Science Alliance (ROSA). 2021. Offshore wind project monitoring framework and guidelines. March 2021. Available online at Resources | ROSA 2021 Updated (rosascience.org).

Reubens, J.T., F. Pasotti, S. Degraer, and M. Vincx. 2013a. Residency, site fidelity and habitat use of Atlantic cod (***Gadus morhua***) at an offshore wind farm using acoustic telemetry. Marine Environmental Research, 50: 128-135.

Reubens, J.T., U. Braeckman, J. Vanaverbeke, C. Van Colen, S. Degraer, and M. Vincx. 2013b. Aggregation at windmill artificial reefs: CPUE of Atlantic cod (Gadus morhua) and pouting (Trisopterus luscus) at different habitats in the Belgian part of the North Sea. Fish. Res. 139:28-34.

Reubens, J.T., S. Degraer, and M. Vincx. 2014. The ecology of benthopelagic fishes at offshore wind farms: A synthesis of 4 years of research, Hydrobiologia 727:121-136,

Rhoads, D.C. and J.D. Germano. 1982. Characterization of organism-sediment relations using sediment profile imaging: An efficient method of remote ecological monitoring of the seafloor (REMOTS System). Marine Ecology Progress Series 8:115–128.

Rhoads, D.C. and L.F. Boyer. 1982. The effects of marine benthos on physical properties of sediments. pp. 3-52. In: Animal-Sediment Relations. McCall, P.L. and M.J.S. Tevesz (eds). Plenum Press, New York, NY.

Rhode Island Coastal Management Council (RICRMC). 2010. Rhode Island Ocean Special Area Management Plan (Ocean SAMP). Volume 1. Adopted October 19, 2010. 1021 pp.

Rhode Island Coastal Resources Management Council (RICRMC). 2018. Regulatory Standards of the Ocean SAMP (650-RICR-20-05-11.10). Subsequently amended effective October 6, 2019.

Rudders, D., 2015. Virginia Institute of Marine Science Dredge Survey Methods Report. From: http://www.cio.noaa.gov/services_programs/prplans/pdfs/ID310_Draft_Product_2-VIMS%20S_Methods%20Review.pdf

Shumchenia, E. and J. King. 2010. Evaluation of sediment profile imagery as a tool for assessing water quality in Greenwich Bay, Rhode Island, USA. Ecol. Indic. 10: 818-825.

References

Siemann, L., and Smolowitz, R. 2017. Southern New England Juvenile Fish Habitat Research Paper. OCS Study BOEM 2017-028.

Simone, M. and J. Grant. 2020. Visually-based alternatives to sediment environmental monitoring. Mar. Poll. Bull. 158. https://doi.org/10.1016/j.marpolbul.2020.111367

Smith, E.P., D.R. Orvos, and J. Cairns. 1993. Impact assessment using the before-after-control- impact (BACI) model: comments and concerns. Canadian Journal of Fisheries and Aquatic Sciences, 50: 627-637.

Smith, D.R., H.J. Brockmann, M.A. Beekey, T.L. King, M.J. Millard, and J. Zaldivar-Rae. 2017. Conservation status of the American horseshoe crab, (Limulus polyphemus): a regional assessment. Reviews in Fish Biology and Fisheries, 27: 135-175.

Snyder, D.B., W.H. Bailey, K. Palmquist, B.R.T. Cotts, and K.R. Olsen. 2019. Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England. OCS Study BOEM 2019-049. US Dept. of the Interior, Bureau of Ocean Energy Management, Headquarters, Sterling, VA.

Sokal, R.R. and F.J. Rohlf. 2001. Biometry. Third Edition. W.H. Freeman and Company. USA. 850 pp.

Steimle, F. 1982. The benthic macroinvertebrates of the Block Island Sound. Estuarine Coastal and Shelf Science 15: 1-16.

Stokesbury, K.D.E. 2013. MA Windfarm Survey, Final Report. School for Marine Science and Technology (SMAST), University of Massachusetts Dartmouth.

Stokesbury, K.D.E. 2014. MA Windfarm Survey, Final Report. School for Marine Science and Technology (SMAST), University of Massachusetts Dartmouth.

Sturdivant, S.K., R.J. Díaz., and G.R. Cutter. 2012. Bioturbation in a declining oxygen environment, in situ observations from Wormcam. PLoS ONE 7(4): e34539.

Theroux, R.B. and R.L. Wigley. 1998. Quantitative composition and distribution of the macrobenthic invertebrate fauna of the continental shelf ecosystems of the northeastern United States. U.S. Dep. Commer. NOAA Tech. Rep. NMFS 140, 240 pp.

Underwood, A.J. 1992. Beyond BACI: the detection of environmental impacts on populations in the real, but variable, world. Journal of Experimental Marine Biology and Ecology, 161: 145-178.

Underwood, A.J. 1994. On beyond BACI: sampling designs that might reliably detect environmental disturbances. Ecol Appl 4: 3–15.

Valliere, A. and S. Pierce. 2007. Southern New England Industry-Based Yellowtail Flounder Survey, 20032005. Report to the National Marine Fisheries Service Contract EA 1337-03-CN-00112.

Venable, W.N. and B.D. Ripley. 2002. Modern Applied Statistics in S: Fourth Edition. Springer Publishing.

References

Walsh, H.J. and V.G. Guida. 2017. Spring occurrence of fish and macro-invertebrate assemblages near designated wind energy areas on the northeast U.S. continental shelf. Fishery Bulletin, 115: 437-450.

Westerberg, H. and I. Lagenfelt. 2008. Sub-sea power cables and the migration behavior of the European eel. Fisheries Management and Ecology, 15: 369-375.

Wilber D.H., D.A. Carey, and M. Griffin. 2018. Flatfish habitat use near North America's first offshore wind farm. Journal of Sea Research 139: 24–32.

Wilber, D., L. Read, M. Griffin, and D. Carey. 2021. Block Island Wind Farm Demersal Fish Trawl Survey, Final Synthesis Report – Years 1 to 7, October 2012 through September 2019. Prepared by INSPIRE Environmental, Newport, RI for Deepwater Wind Block Island, LLC, Providence, RI. 103 pp. ++ Appendices.

Wilber D.H., L.B. Read, M. Griffin, G.R. DeCelles, and D.A. Carey. In review. Offshore wind farm effects on flounder and gadid dietary habits and condition on the northeastern US coast. Mar. Ecol. Prog. Ser.

Wilhelmsson, D., and Malm, T. 2008. Fouling assemblages on off- shore wind power plants and adjacent substrata. Estuarine Coastal and Shelf Science, 79: 459–466.

Winter, H.V., G. Aarts, and O.A. van Keeken. 2010. Residence time and behavior of sole and cod in the offshore wind farm Egmond aan Zee (OWEZ). IMARES Report number C038/10. 50 pp.

Winton, M.V., J. Kneebone, D.R. Zemeckis, and G. Fay. 2018. A spatial point process model to estimate individual centres of activity form passive acoustic telemetry data. Methods in Ecology and Evolution, 9: 2262-2272.

Wuenschel, M.J., K.W. Able, and D. Byrne. 2009. Seasonal patterns of winter flounder ***Pseudopleuronectes americanus*** abundance and reproductive condition on the New York Bight continental shelf. Journal of Fish Biology, 74: 1508-1524.

Zemeckis, D.R., M.J. Dean, A.I. DeAngelis, S.M. Van Parijs, W.S. Hoffman, M.G. Baumgartner, L.T. Hatch, S.X. Cadrin, and C.H. McGuire. 2019. Identifying the distribution of Atlantic cod spawning using multiple fixed and glider-mounted technologies. ICES Journal of Marine Science, 76(6): 1610-1625.

Ziegler, C.M., J.P. Zacharias, and M.G. Frisk. 2019. Migration diversity, spawning behavior, and habitat utilization of winter flounder. Canadian Journal of Fisheries and Aquatic Sciences, 76:1503-1514.

APPENDICES

APPENDIX A - VMS MAPS OF FISHING ACTIVITY

Appendix A - VMS Maps Of Fishing Activity

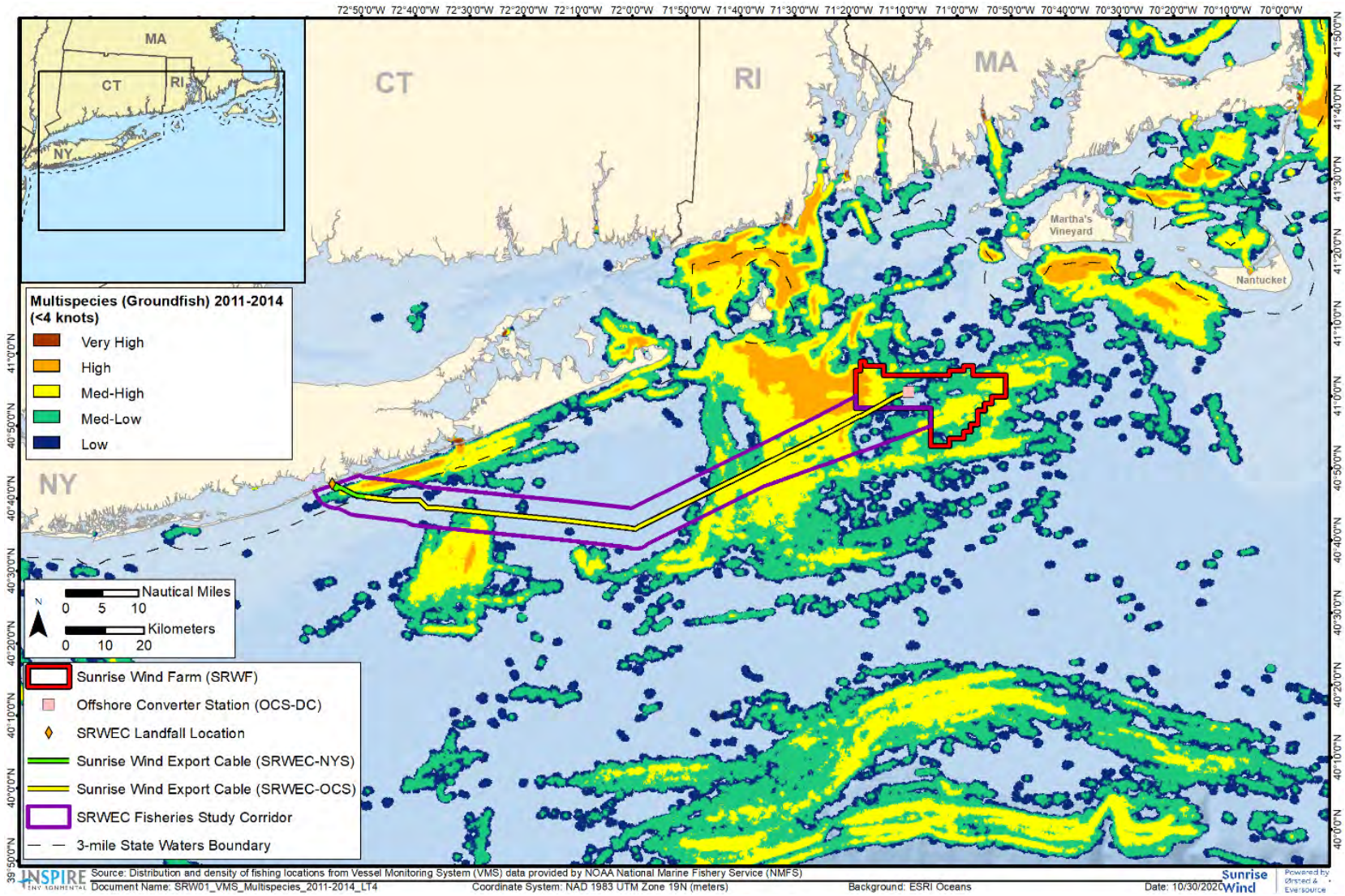


Figure A-1. VMS Map of Vessel Intensity for Large-mesh Multispecies (Groundfish) Fishing, 2011 to 2014

Appendix A - VMS Maps Of Fishing Activity

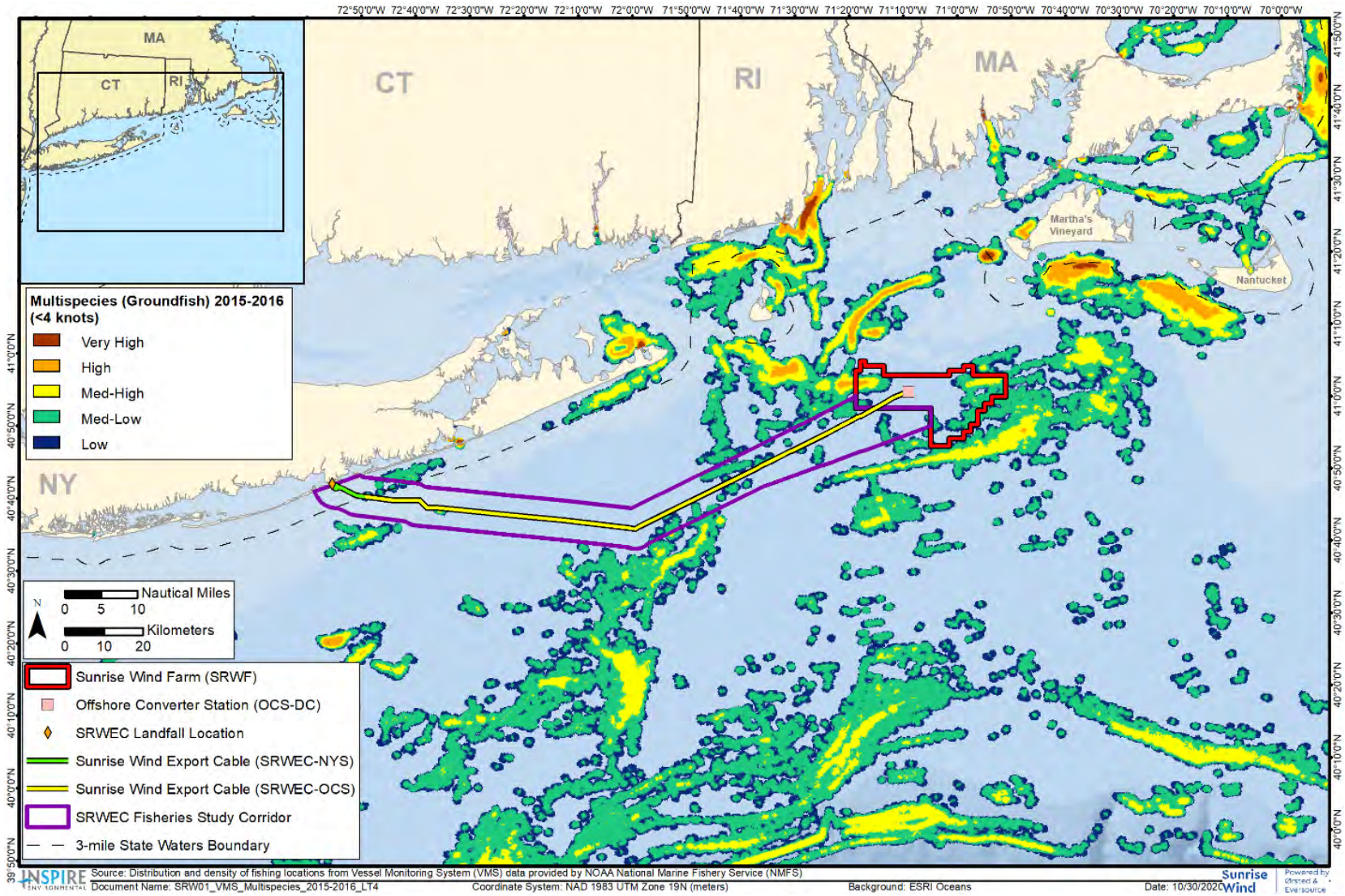


Figure A-2. VMS Map of Vessel Intensity for Large-mesh Multispecies (Groundfish) Fishing, 2015 to 2016

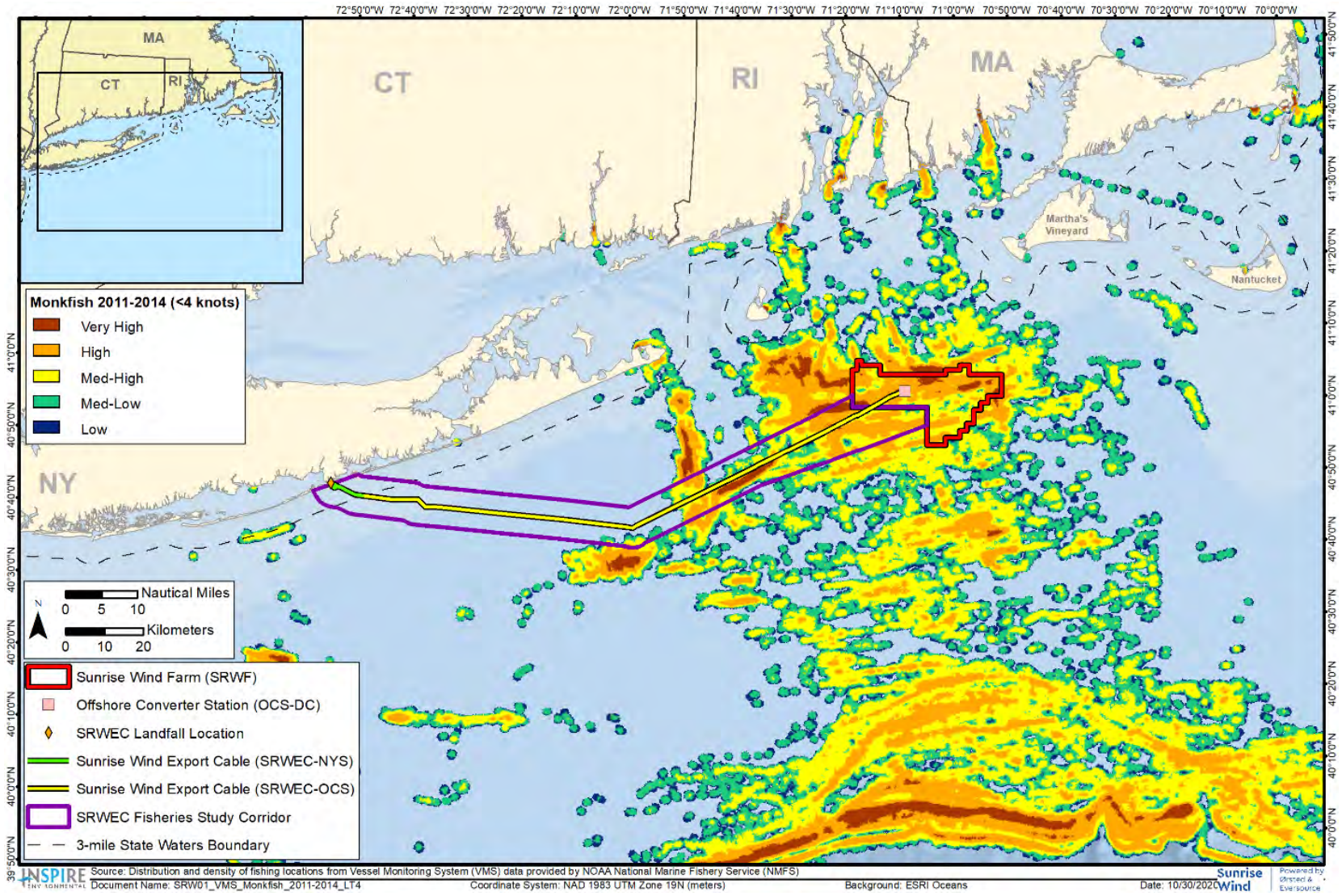


Figure A-3. VMS Map of Vessel Intensity for Monkfish Fishing, 2011 to 2014

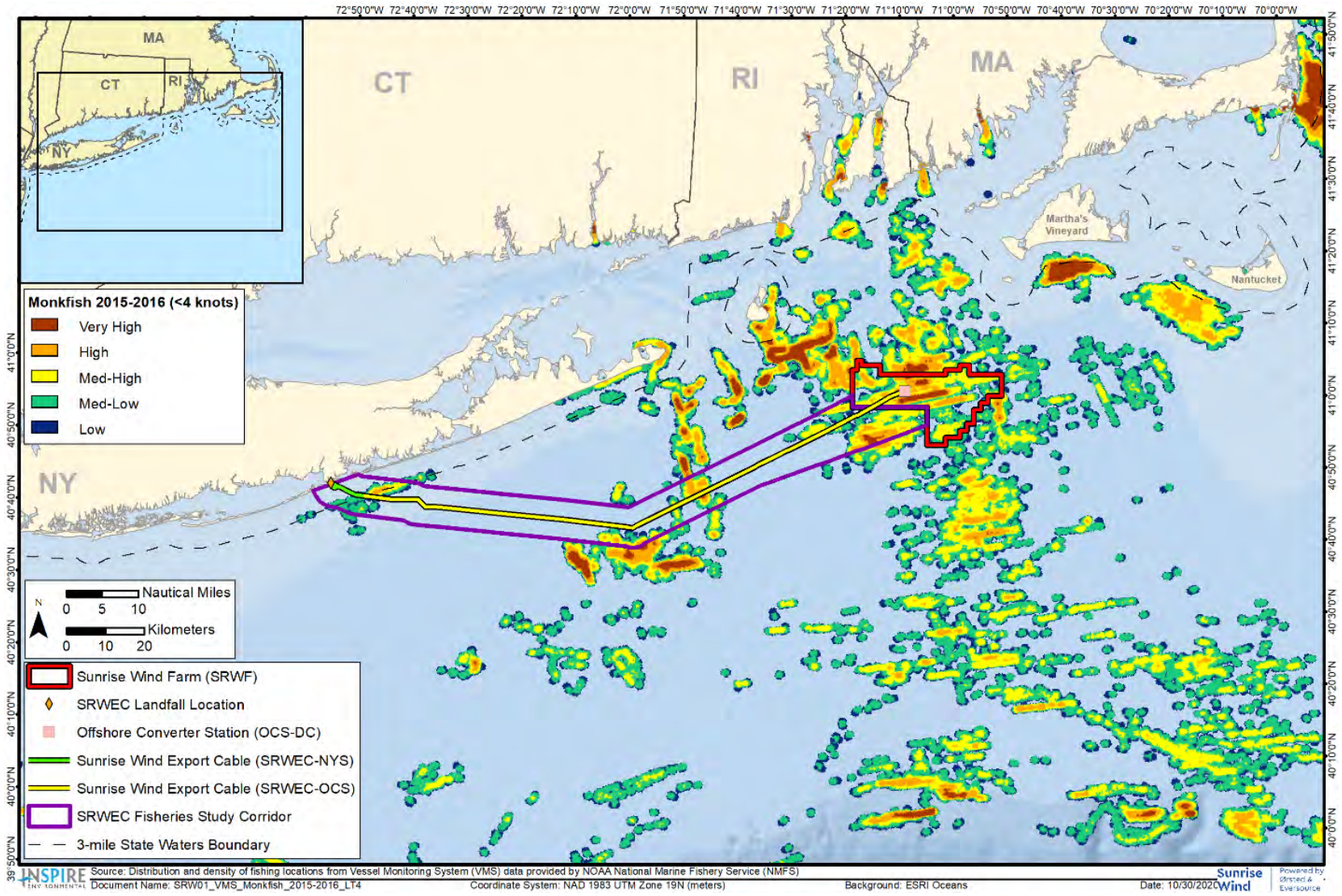


Figure A-4. VMS Map of Vessel Intensity for Monkfish Fishing, 2015 to 2016

Appendix A - VMS Maps Of Fishing Activity

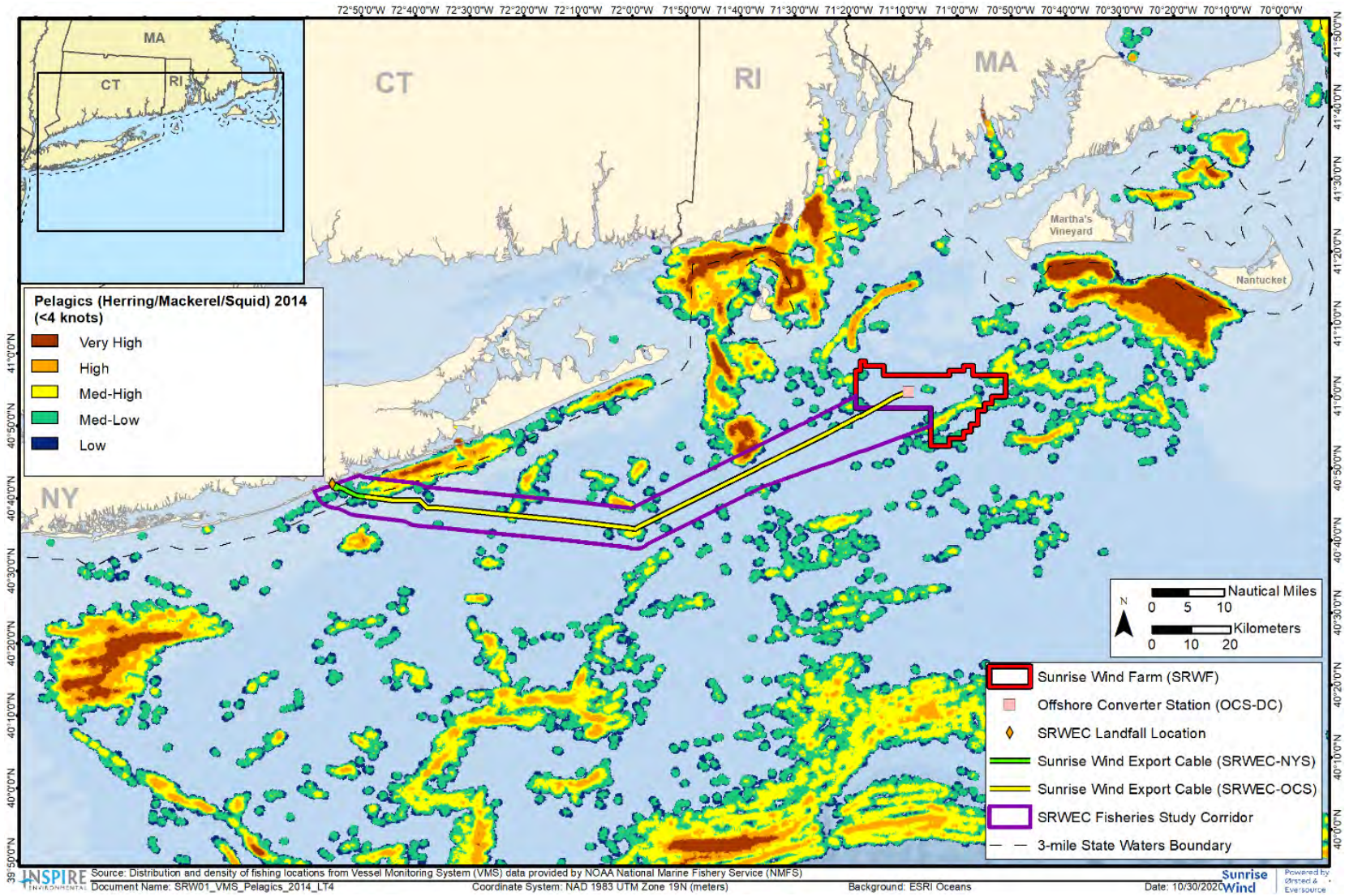


Figure A-5. VMS Map of Vessel Intensity for Pelagic Species (Herring/Mackerel/Squid) Fishing, 2014

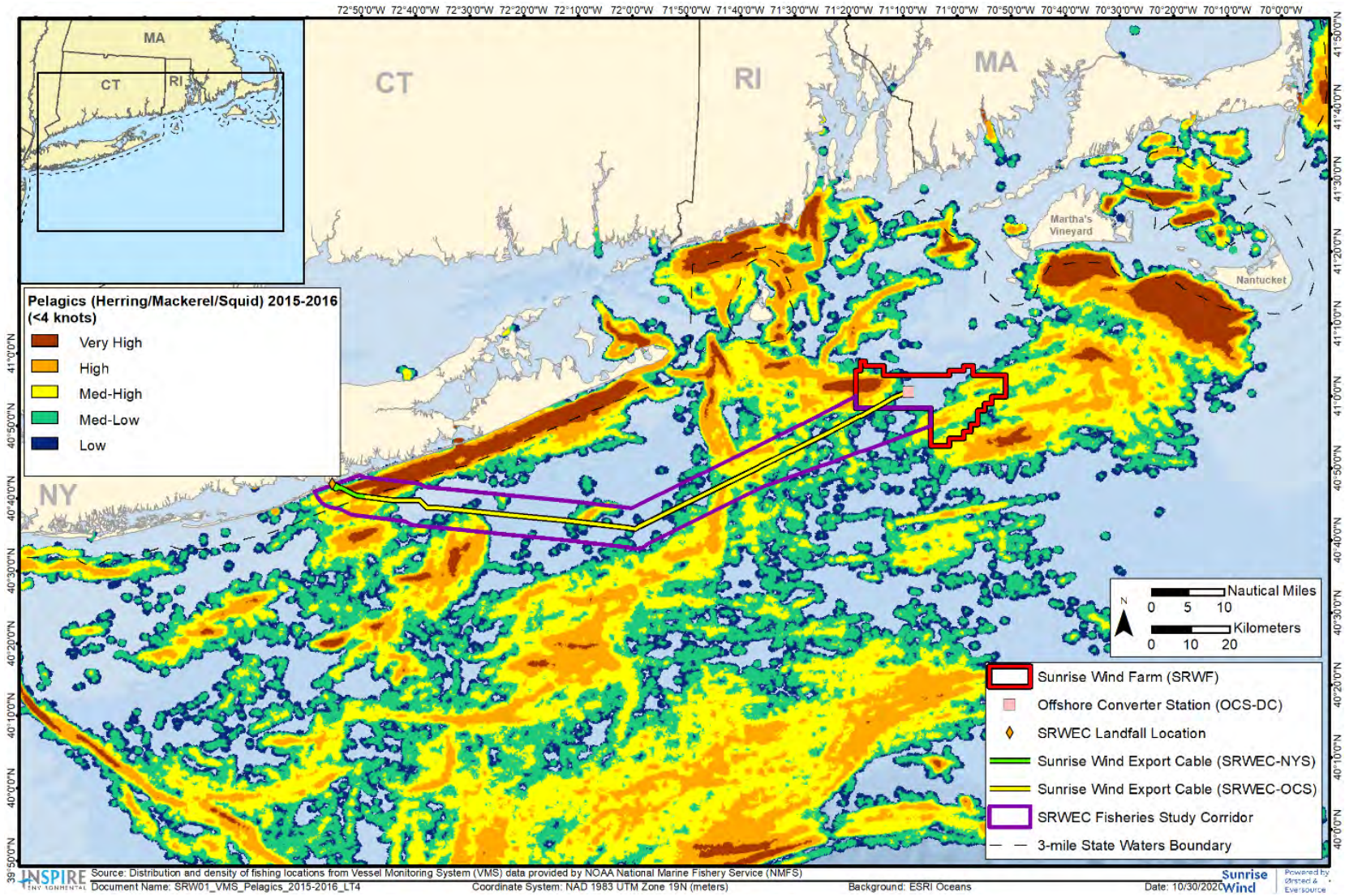


Figure A-6. VMS Map of Vessel Intensity for Pelagic Species (Herring/Mackerel/Squid) Fishing, 2015 to 2016

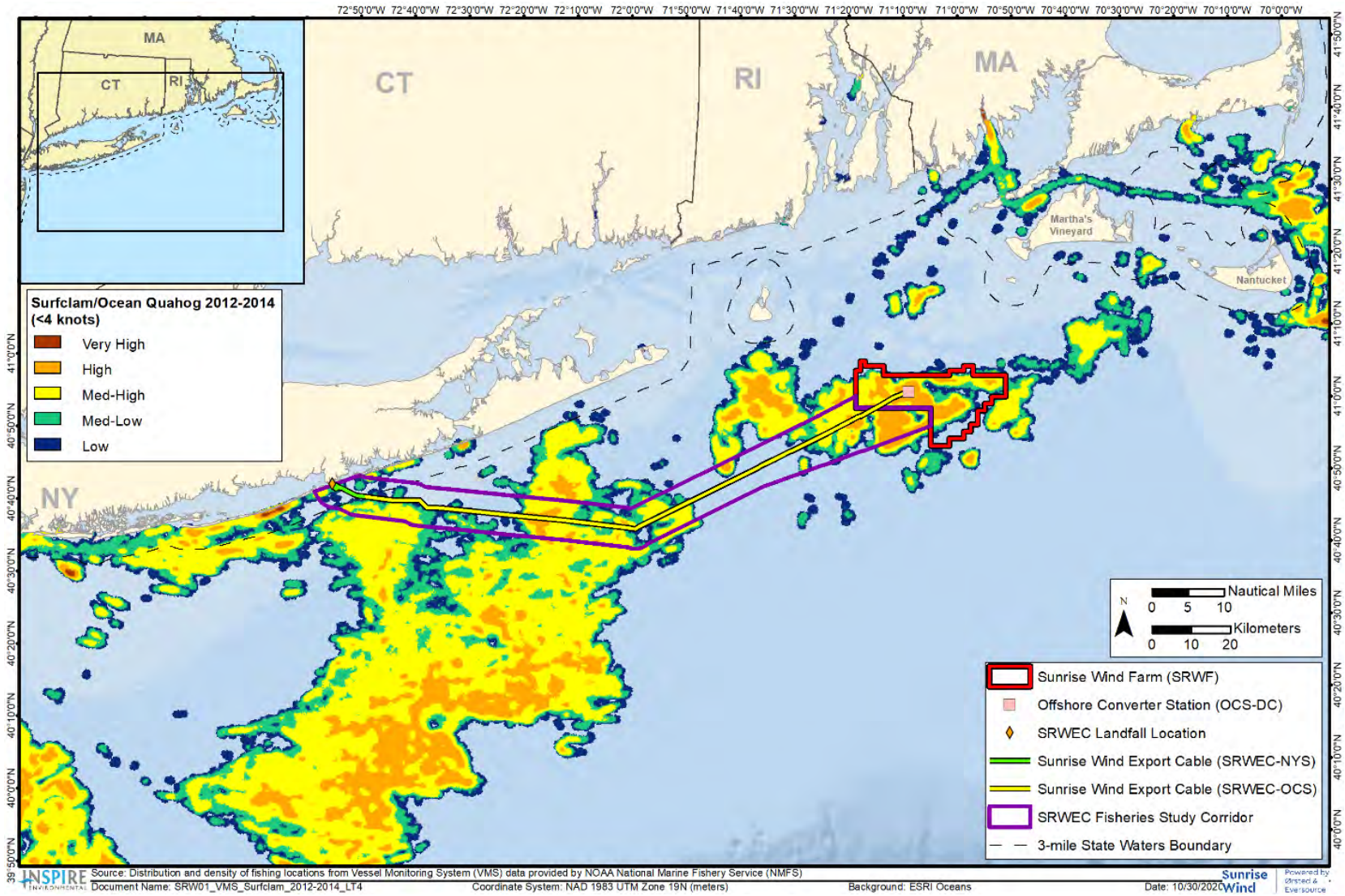


Figure A-7. VMS Map of Vessel Intensity for Surfclam/Ocean Quahog Fishing, 2012 to 2014

Appendix A - VMS Maps Of Fishing Activity

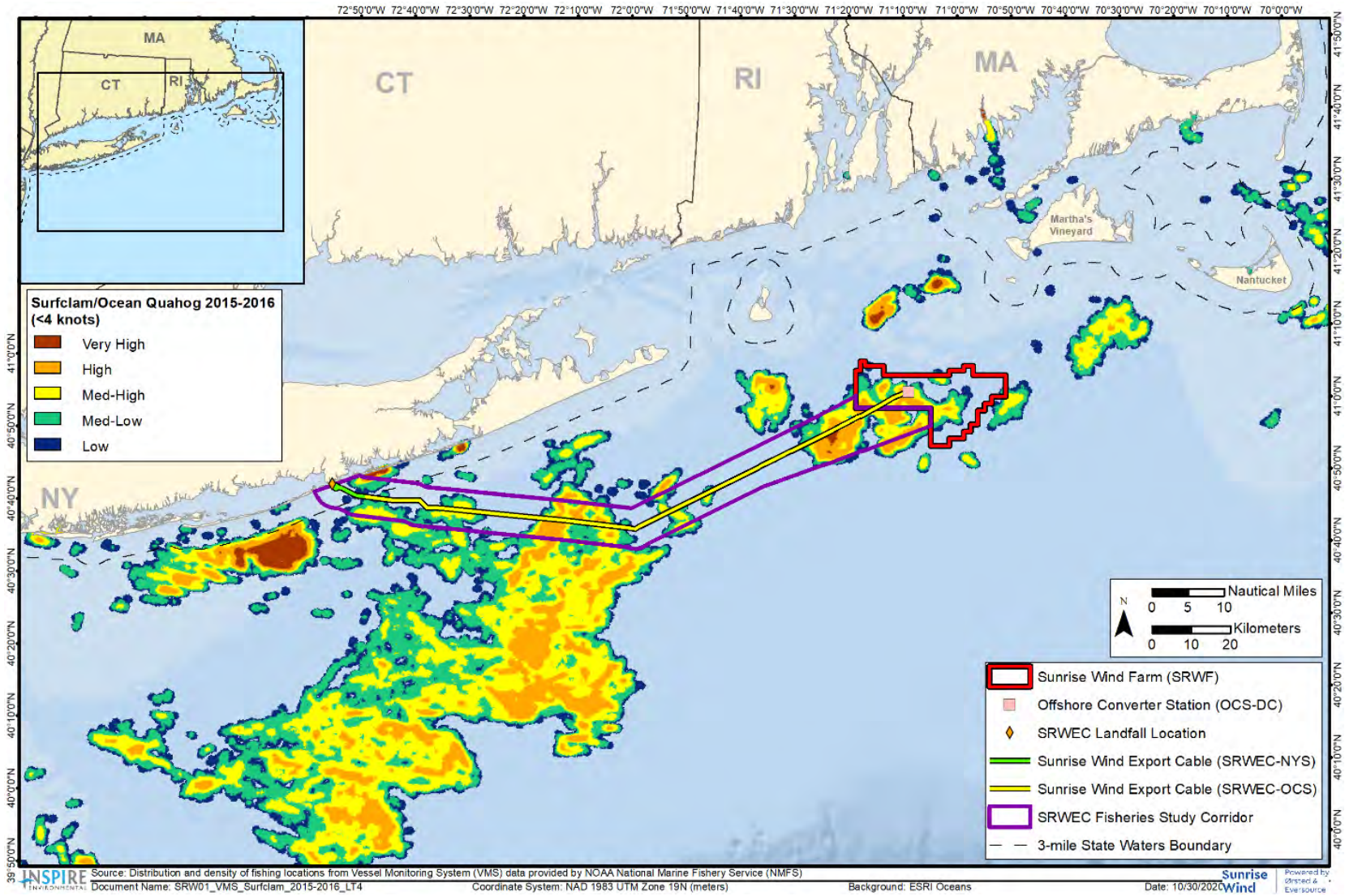


Figure A-8. VMS Map of Vessel Intensity for Surfclam/Ocean Quahog Fishing, 2015 to 2016

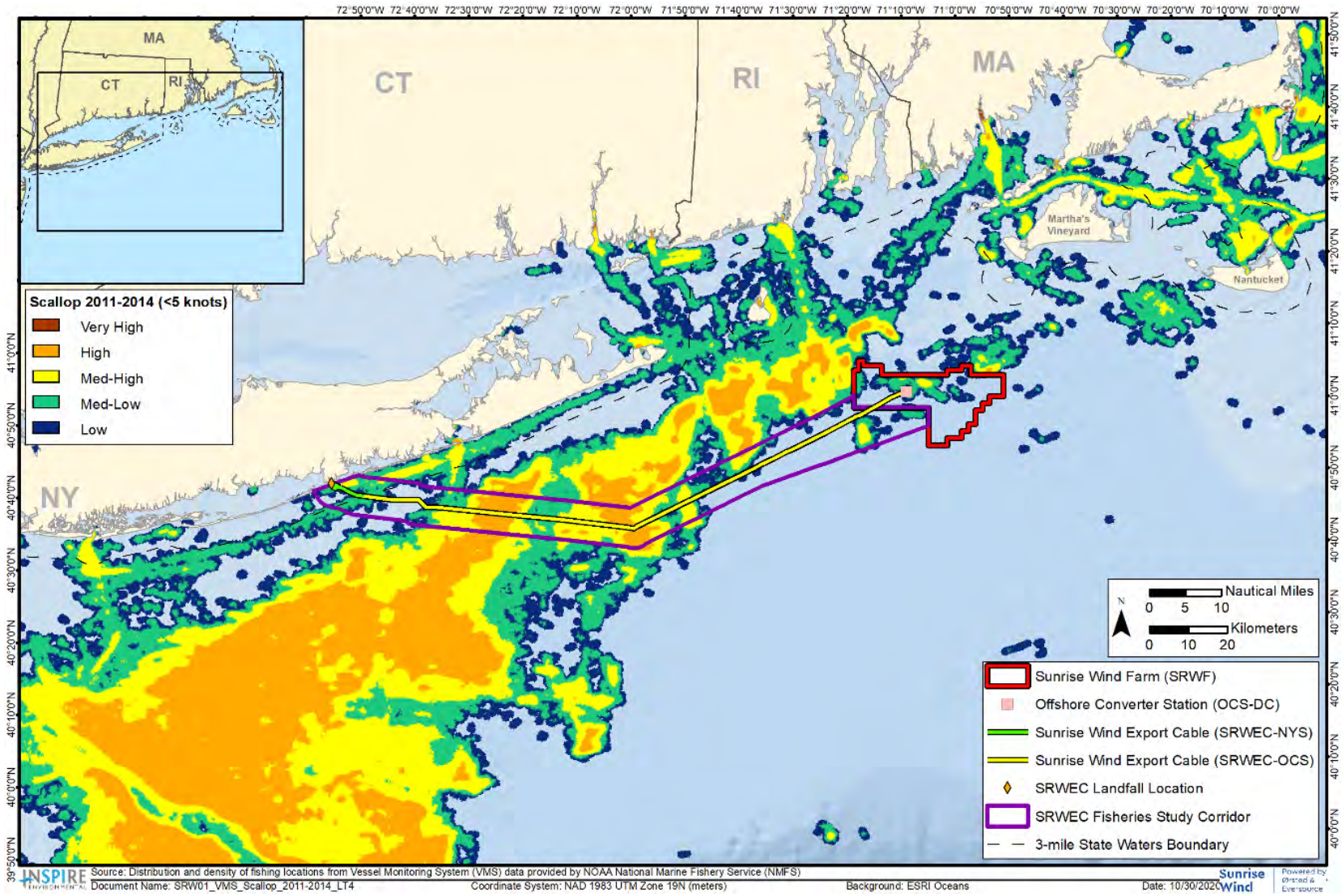


Figure A-9. VMS Map of Vessel Intensity for Sea Scallop Fishing, 2011 to 2014

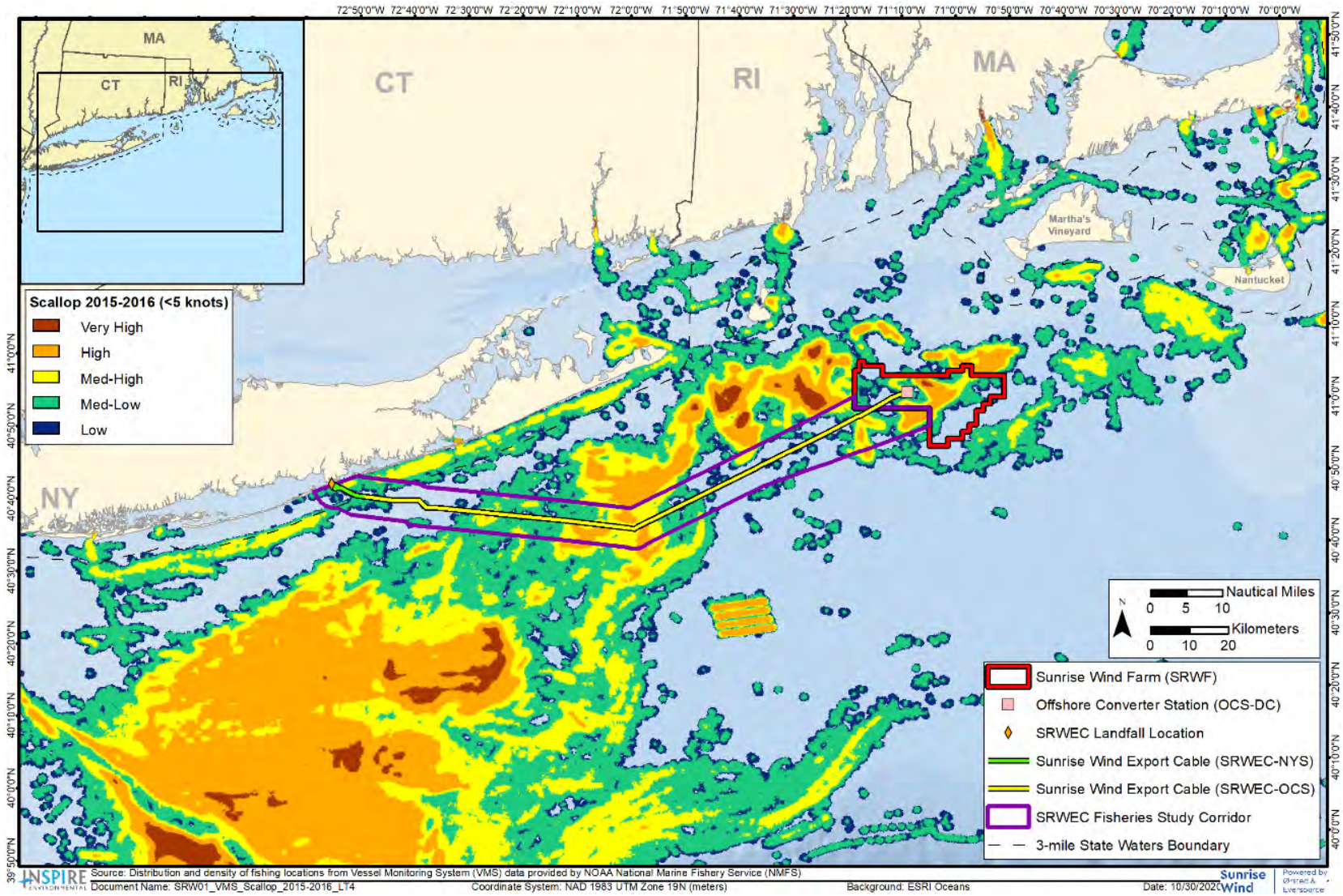


Figure A-10. VMS Map of Vessel Intensity for Sea Scallop Fishing, 2015 to 2016

Appendix A - VMS Maps Of Fishing Activity

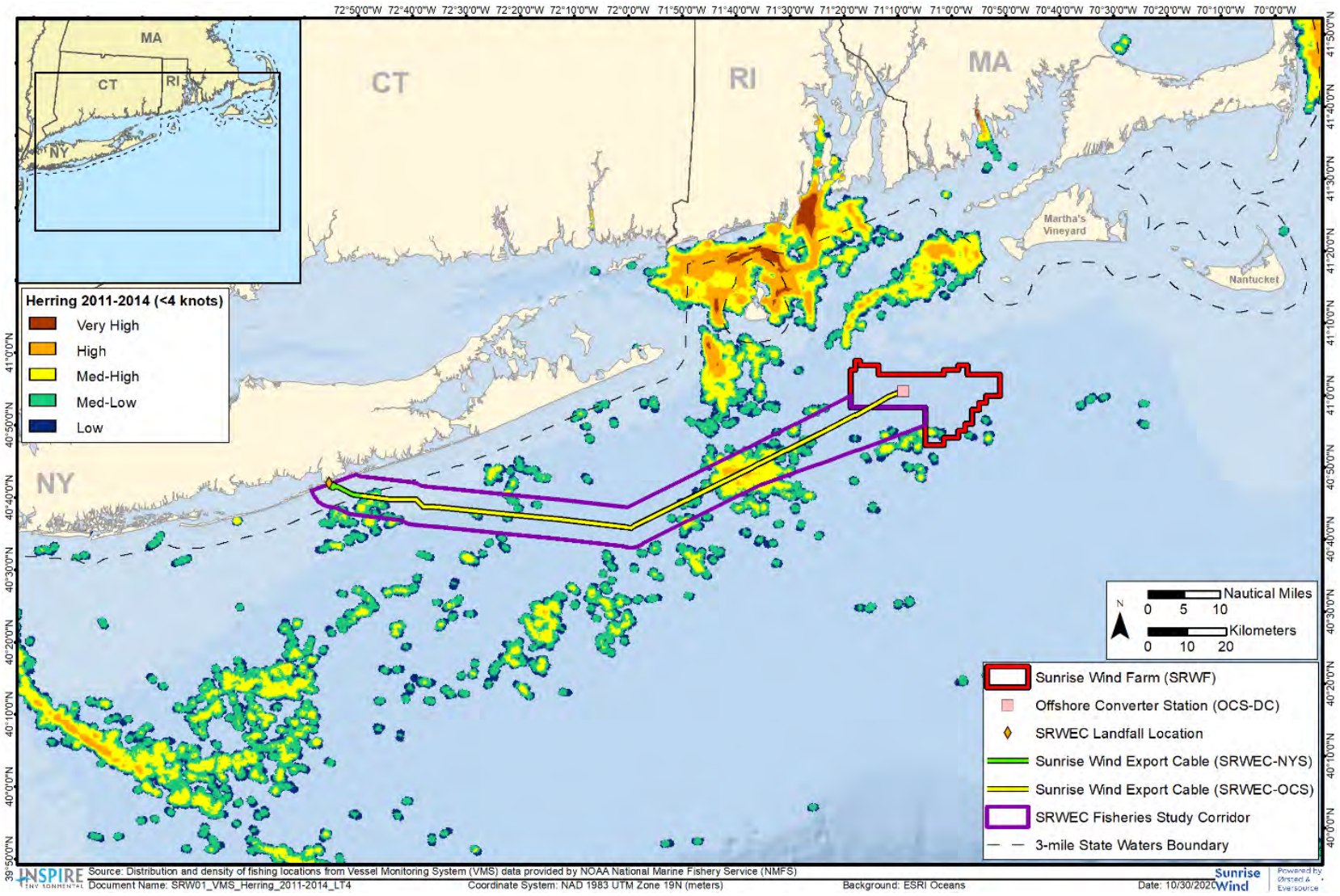


Figure A-11. VMS Map of Vessel Intensity for Atlantic Herring Fishing, 2011 to 2014

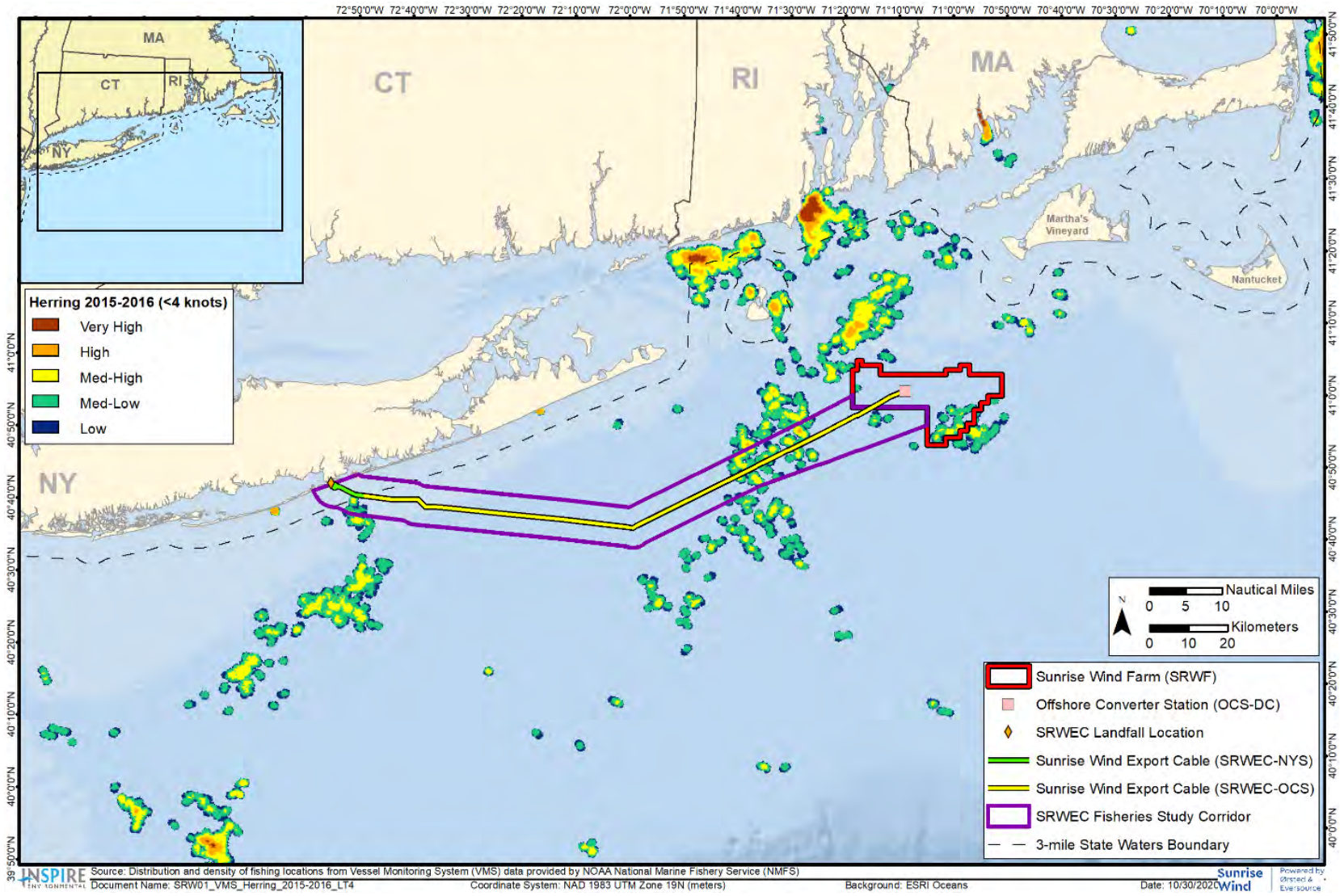


Figure A-12. VMS Map of Vessel Intensity for Atlantic Herring Fishing, 2015 to 2016

Appendix A - VMS Maps Of Fishing Activity

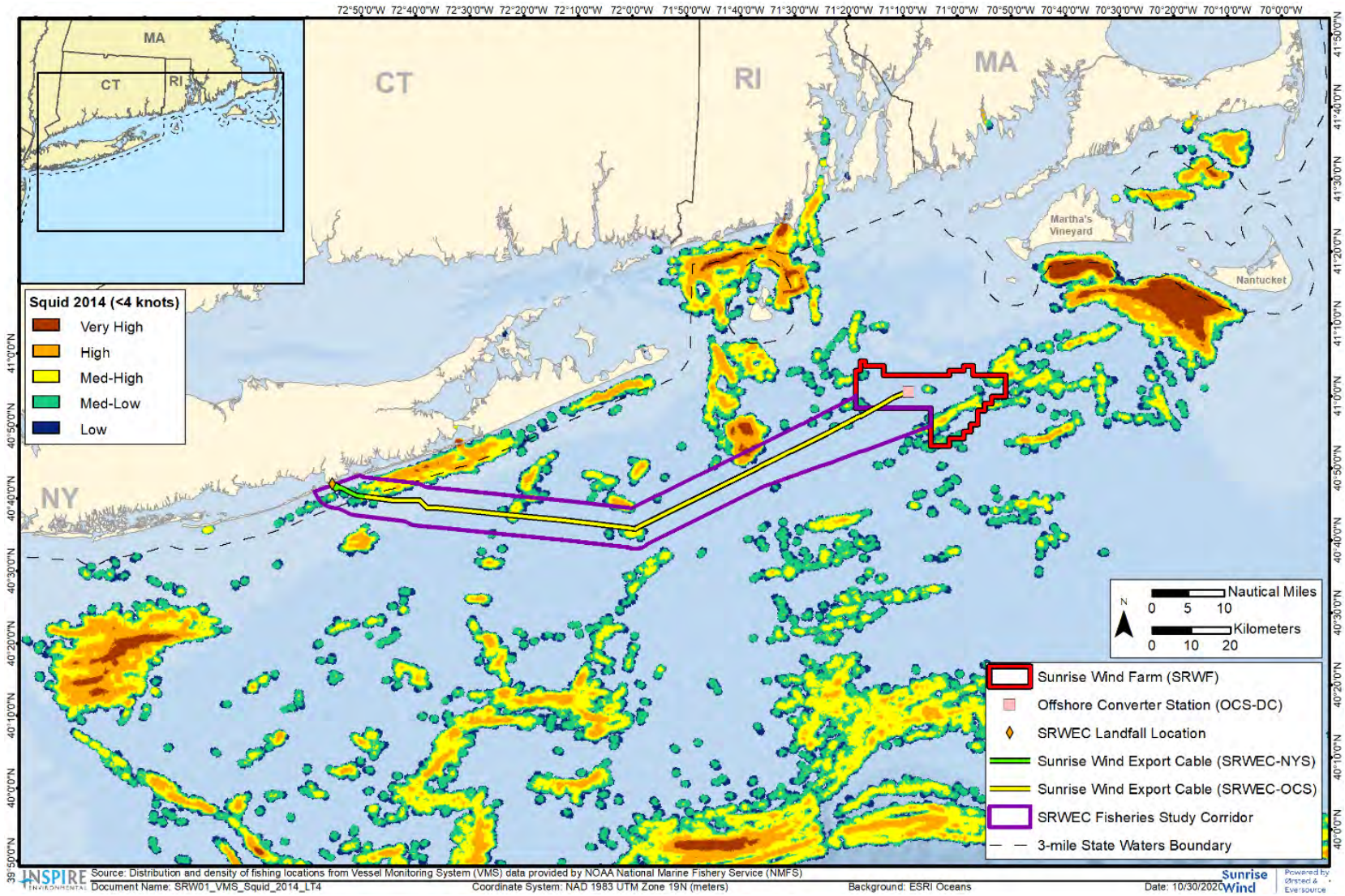


Figure A-13. VMS Map of Vessel Intensity for Squid Fishing, 2014

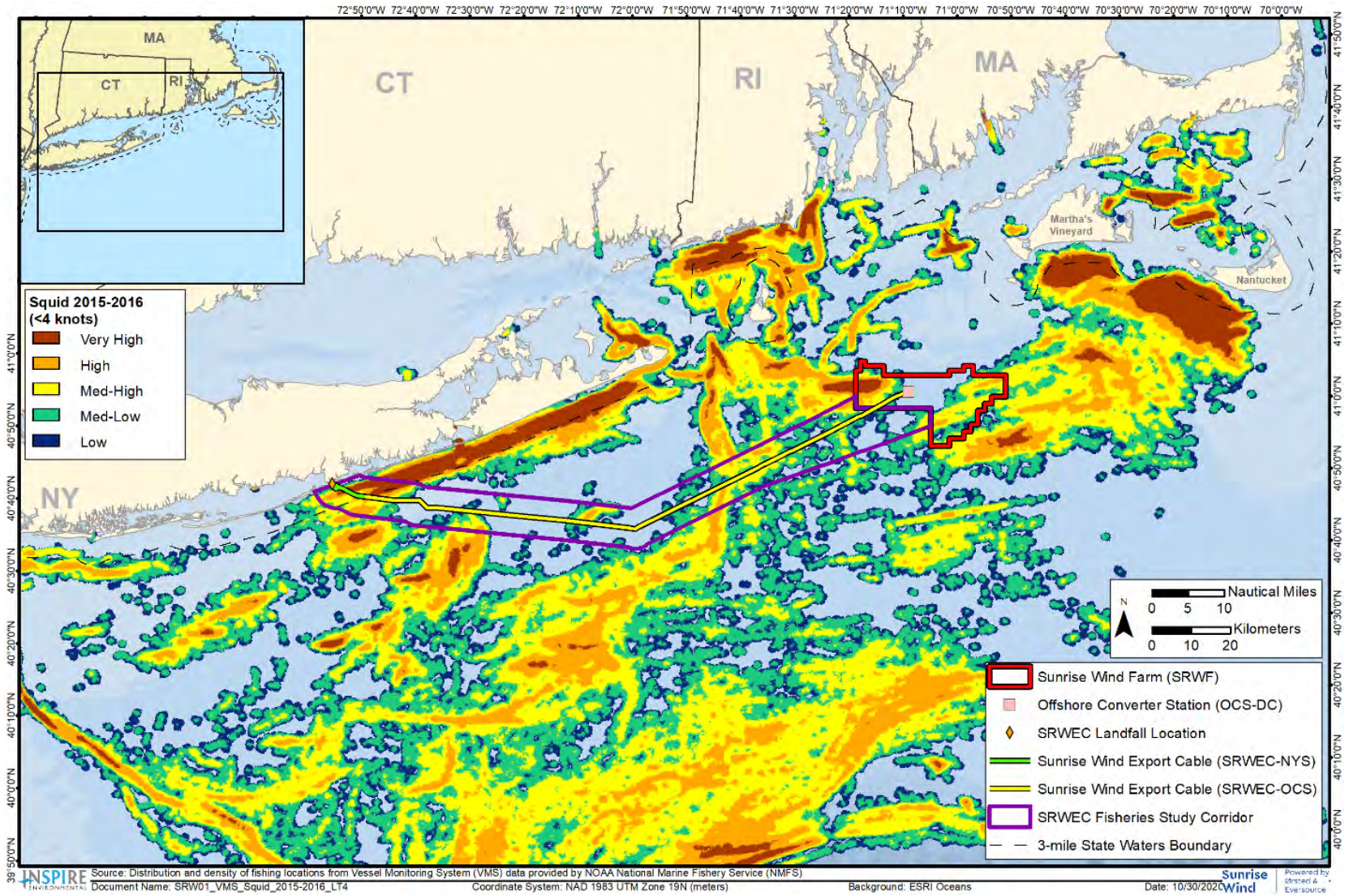


Figure A-14. VMS Map of Vessel Intensity for Squid Fishing, 2015 to 2016

APPENDIX B – POWER ANALYSIS

Appendix B: Trawl Survey Power Analysis

Prepared by Lorraine Brown
EXA Data and Mapping

1.0 Introduction

For the otter trawl survey, an asymmetrical BACI design is planned at both the Sunrise Wind Farm (SRWF) and the Revolution Wind Farm (RWF) project area. The trawl survey will use NEAMAP survey gear and sampling protocols and is intended to capture a range of benthic and pelagic fish species, as well as commercially important invertebrate species.

This appendix covers two topics:

1. A review of existing trawl survey datasets in the vicinity of SRWF and RWF project areas, including data from the NEFSC trawl survey (Politis et al. 2014) and data collected in the reference areas during the BIWF trawl survey (Wilber et al. 2020). These datasets were evaluated to establish the proximate range of a meaningful effect size in measuring change over time, as well as reasonable ranges for interannual and intraannual variability (i.e., the coefficient of variation [CV]) to use in the power analyses.
2. A power simulation study for a BACI design and analysis contrasting fish/invertebrate biomass between an impact area and reference areas. Effect sizes and CVs were derived from the NEFSC and BIWF trawl survey datasets (Topic 1 above).

2.0 Power Analysis Elements

A statistical power analysis requires specification of the following:

- Study design specifics (e.g., number of replicates, number of sites, number of seasons/sampling events, sampling duration before and after construction), and their structure (e.g., random trawls as independent replicates within each site and sampling event, or fixed trawls nested within sites and repeatedly sampled over time).
- The statistical model, which is determined by the study design (previous bullet) and characteristics of the data (e.g., catch data as biomass might be modeled with a generalized linear or additive model with normal errors and a log-link; catch data as counts might be modeled with a generalized linear or additive model with Poisson errors, or with a negative binomial if the count data are over-dispersed; presence/absence data might be modeled with logistic regression and binomial errors).

A statistical power analysis relates the following four elements; given three of these elements, the fourth can be estimated:

- **Effect size (Δ)** is a measure of change in the data that the study design and modelling approach will be used to estimate. Measures of effect size can be summarized in a number of different ways (e.g., Durlak 2009); standardized effect sizes such as the magnitude of difference expressed as a percent of the standard deviation are useful for comparisons across studies. These can be difficult to understand, however; and when the unit of measure itself is meaningful (e.g., catch ratios) it is more useful to present results in terms of unstandardized effect sizes. For the purposes of this appendix, unstandardized effect sizes are expressed as the temporal change at the impact site relative to temporal change at the reference sites (Eq. 1). Since this value is not standardized to variance, power for different relative change values (effect sizes) is evaluated across a range of variance estimates.

The relative proportional change (PC) at the impact site is the proportional change between periods of the mean catch per tow at the Impact site relative to the proportional change between periods of the mean catch per tow at the Reference site(s) minus one:

Effect Size as Proportional Change (PC) = [illegible] − 1 [Eq. 1]

The same PC could represent any number of ratios. For example, a PC of –0.33 (-33%) could represent a 33% decrease in catch at the impact site and no change at the reference site(s) (i.e., 0.67/1 -1 = -0.33). This PC of -0.33 could also represent a 50% decrease at the impact site and a 25% decrease at the reference site (i.e., 0.5/0.75-1= -0.33); or a 20% decrease at the impact site and 20% increase at the reference (i.e., 0.8/1.2-1 = -0.33); or other similar combinations that yield a PC value of -0.33.

In the context of statistical power analysis, a threshold effect size considered to be meaningful (Δ_M) is specified and the probability this difference would be statistically significant at the designated α, is the power (power = 1-β, where β is the type II error). Outside of statistical power analysis, observed effect size or level of change is a way of summarizing the metric of interest that can be compared across studies, and is not inherently tied to statistical significance or statistical power. In fact, the observed proportional changes among reference areas are used to establish what constitutes a meaningful threshold effect size or level of proportional change (Δ_M) for impact studies.

- **Power** (1-β, where β is the Type II error) is the probability of rejecting the null hypothesis when the difference in the data exceeds a threshold effect size (Δ_M). In the BACI design setting, it is the probability of finding the interaction BACI contrast to be statistically significant when a proportional change of size Δ_M is present in the populations.
- **Alpha (α)** is the Type I error, or the probability of rejecting the null hypothesis in error because the true difference is null. The value α is typically fixed, at 0.05 or 0.10 (95% or 90% confidence). For power estimated through simulations, α is estimated as the percent of significant outcomes when the proportional change imposed on the data was 0. For this study, α = 0.10 was used for the two-tailed null hypothesis which allows us to say whether results are significantly greater than or less than one (the one-tailed hypotheses), with 95% confidence (α = 0.05) on each side.
- **Sample size** encompasses the number of sites, replicates, and time periods that are sampled and determines the degrees of freedom for the statistical tests. In this analysis, the overall design was set (i.e., 1 impact site and 2 reference sites; 2 years of monitoring before and after construction, and 4 seasonal trawl surveys per year) and sample size refers to the number of tows per season in each area. Precision for the annual estimates can be improved by appropriate survey timing (i.e., surveys are timed to not miss the seasonal peaks in biomass/abundance), using consistent survey methods, and greater replication (tows per season, years per period, or areas per location). All else being equal, as replication increases, the precision estimates for the model parameters increase. This will result in higher power for a specific level of change, or a smaller detectable level of change for a specific level of power.

3.0 Review Existing Datasets

Station level catch data from the NEFSC trawl survey was provided by Phil Politis. The data request was limited to species of recreational and commercial importance that were expected to occur in Strata 1050. The NEFSC (Politis et al. 2014) trawl dataset was used to establish 1) a proximate range of proportional change over time, and 2) the expected distributional form for the catch as biomass and reasonable variance estimates. The NEFSC dataset was screened to only include:

- tows from Stratum 1050, which includes the location for the SRWF and RWF projects (Figure B-1).
- selected species of commercial and recreational importance (Table B-1).

This NEFSC survey design included four to five (random) replicate tows per season in survey strata 1050 from Spring (late March to early May) and Fall (late September to early October) in the years 2010 to 2018, with replicate tows for each season generally occurring on the same day. This dataset provides an adequate representation of the spatial variance among tows during each survey event (i.e., the within-season variability) for this approximately 5,100 km^2 stratum and provides estimates of the natural levels of inter-annual changes in catch. The NEFSC trawl survey is limited to spring and fall. Therefore, monthly data from the Block Island Wind Farm (BIWF) trawl survey were also reviewed (Section 3.2) to determine the extent to which the seasonal NEFSC trawl survey captured intraannual biomass peaks for different species of interest. Given that biomass and abundance can vary substantially throughout the course of the year within the proposed Project area, it is important to ensure that this intraannual variability is accounted for when estimating the expected variance for the species of interest in the seasonal trawl survey.

The tows in the NEFSC dataset are at a lower spatial density than what is planned for the trawl survey. We expect the NEFSC estimates of spatial variance to be conservatively high relative to the variance expected from the RWF monitoring, because the trawl survey will occur over a smaller spatial area, so less spatial heterogeneity may be expected amongst replicate tows. The trawl survey will maintain the same spatial sampling densities within the two impact areas and the two reference areas (i.e., all sampling areas will be approximately the same size, and within the boundaries of Stratum 1050).

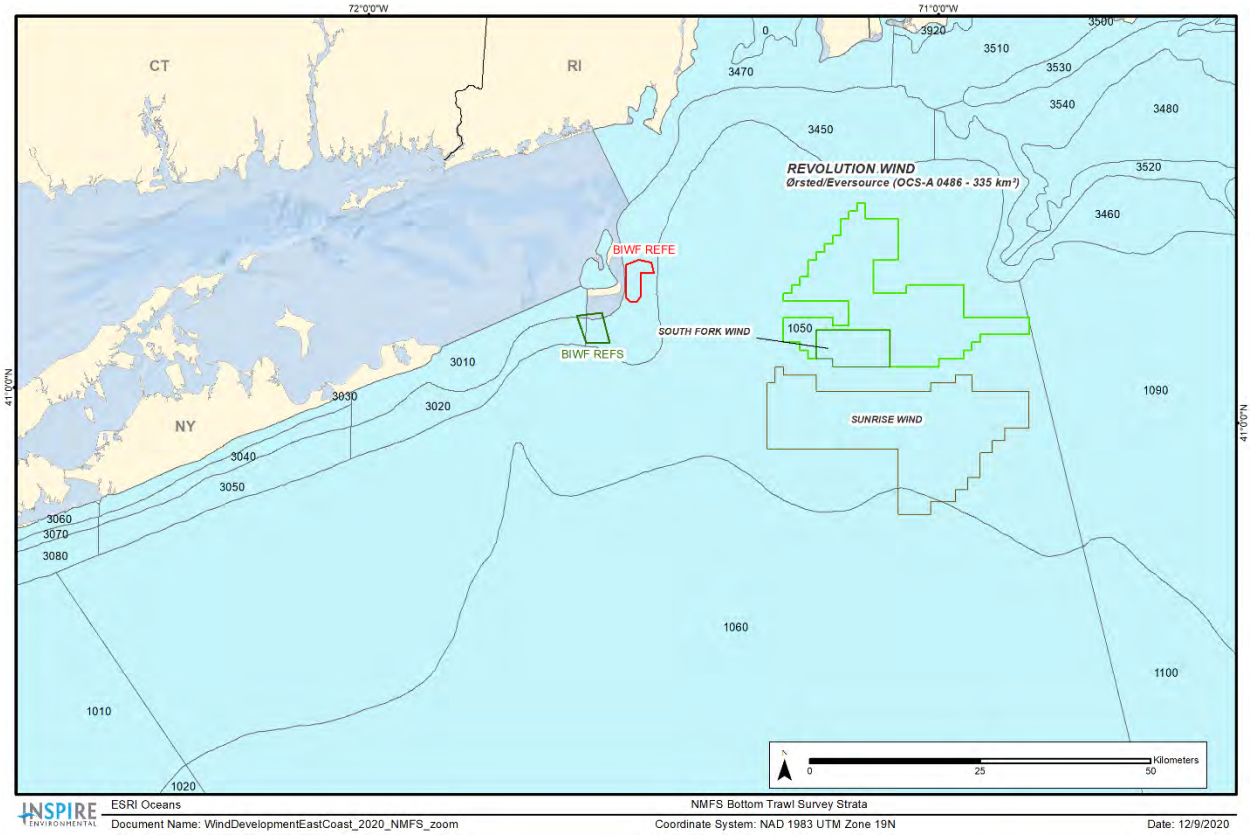


Figure B-1. Map of NEFSC strata and the Sunrise Wind and Revolution Wind project areas. Trawl survey data sampled in strata 1050 from 2010-2018 were used in the analysis. The reference sites used in the BIWF Trawl survey (REFE and REFS) are also shown.

Table B-1. Summary of total catch (biomass, kg) for individual fish and invertebrate species from the NEFSC trawl survey (Politis et al. 2014) sampled in Stratum 1050 from 2010 through 2018. These catch data were used in this analysis.

Species	Total biomass (kg)
Longfin squid	523
Little skate	6422
Summer flounder	507
Windowpane flounder	119
Winter skate	2709
Winter flounder	481
Butterfish	587
Atlantic herring	580
Black sea bass	276
Silver hake	576
Scallop	418
Yellowtail flounder	277
Scup	1471
Red hake	29
Atlantic mackerel	17
Goosefish	124
Bluefish	50
Atlantic menhaden	0
Channeled whelk	0
Knobbed whelk	0
Spanish mackerel	0
Tautog	0
Minimum	0
Maximum	6422
Median	276

Appendix B – Power Analysis

To demonstrate the seasonal variability in mean catch rates in stratum 1050, a summary of the mean catch per tow (kg) for the species shown in Table B-1 is presented by season and year in Figure B-2.

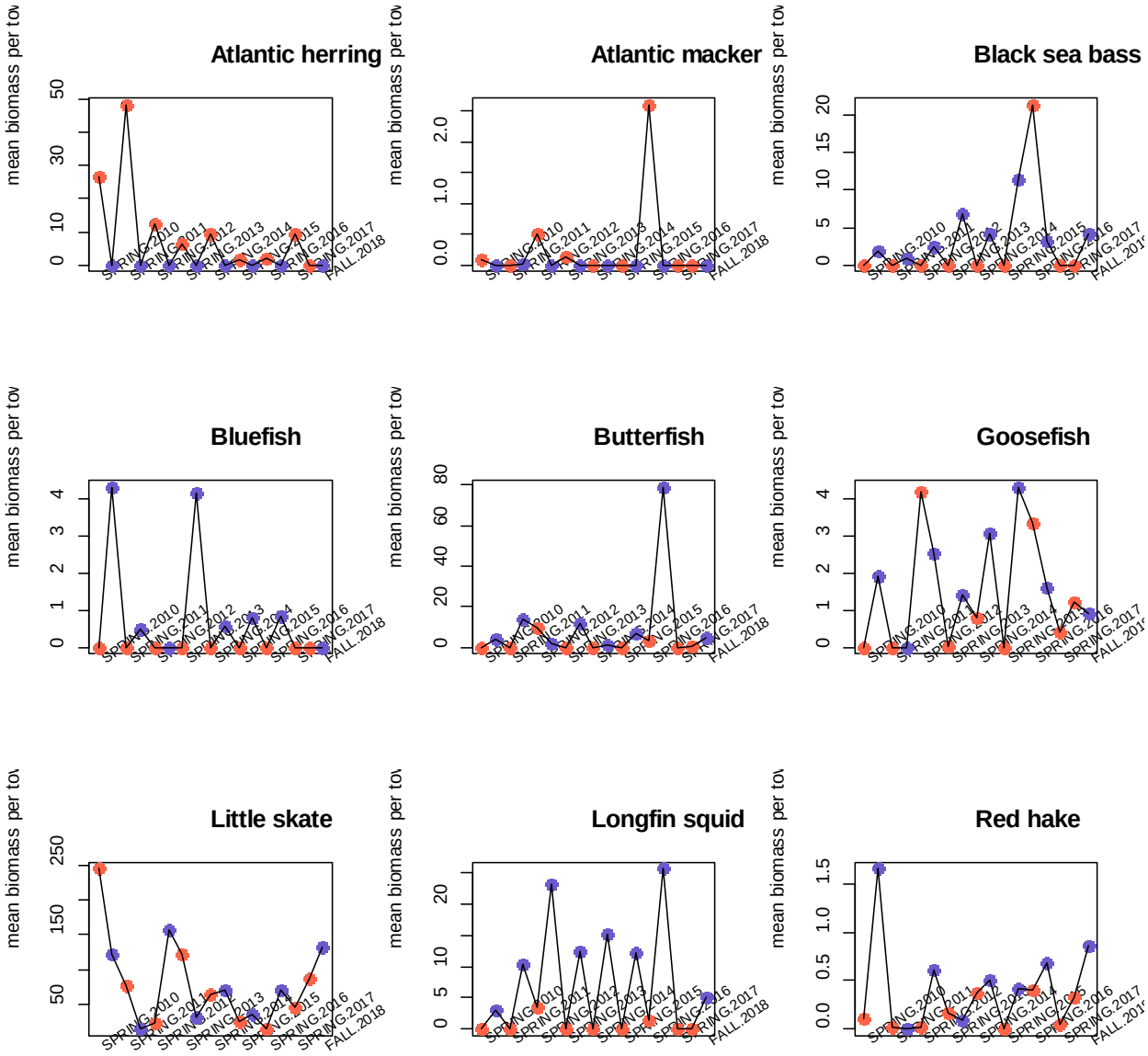


Figure B-2a. Mean seasonal catch per tow (kg) across season and year, for selected species (Atlantic herring to Red hake) sampled in strata 1050 during the NEFSC seasonal trawl survey from 2010 through 2018. The orange dots represent spring surveys, blue dots represent fall surveys.

Appendix B – Power Analysis

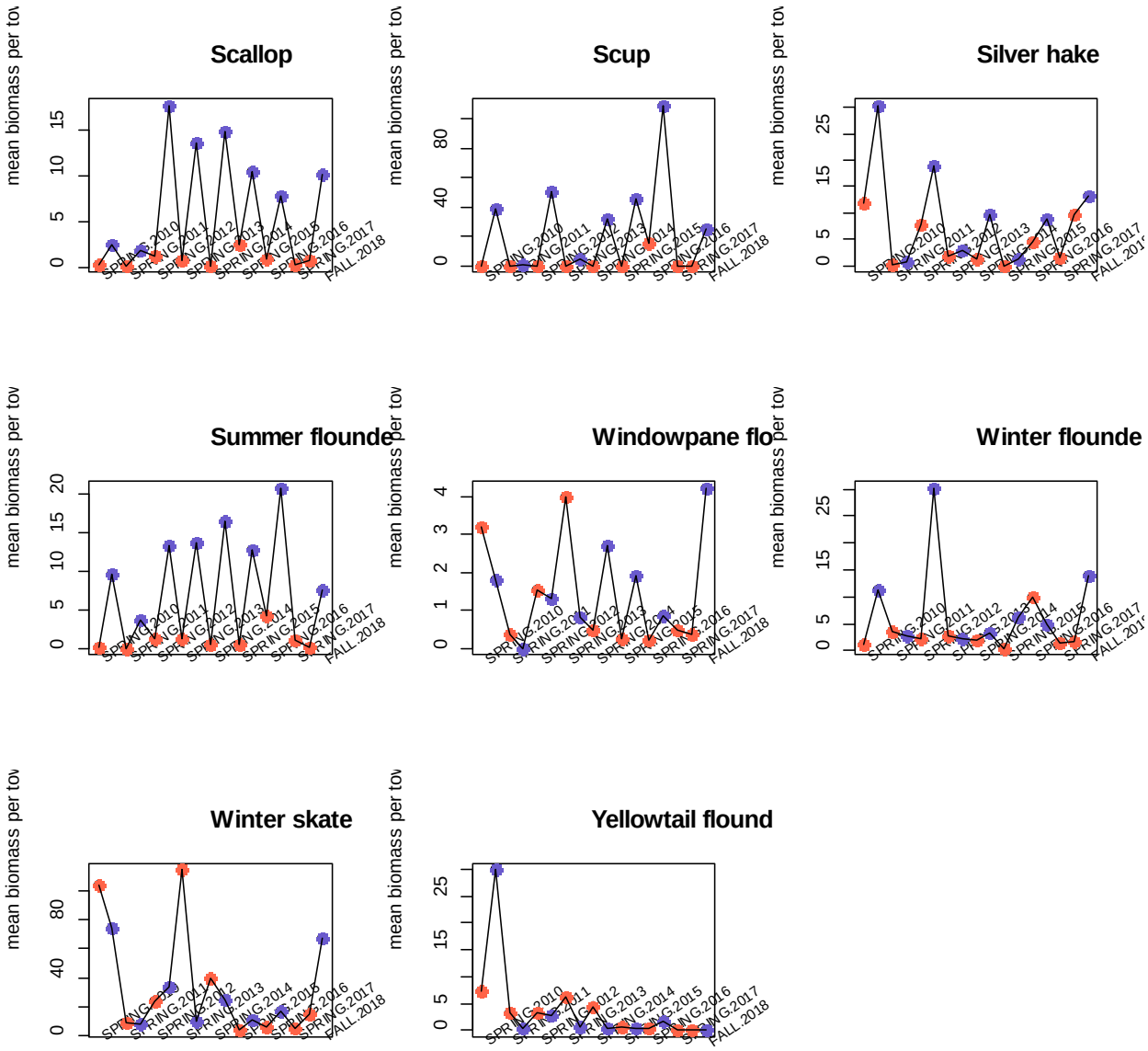


Figure B-2b. Seasonal catch per tow (kg) across season and year, for selected species (Scallop to Yellowtail flounder) sampled in strata 1050 during the NEFSC seasonal trawl survey from 2010 through 2018. The orange dots represent spring surveys, blue dots represent fall surveys.

3.1 Block Island Wind Farm Trawl Survey Data

Intraannual variation in catch rates (kg/tow) were examined for several species from the monthly trawl survey that occurred over seven years at the two reference areas used in the Block Island Wind Farm (BIWF) monitoring. The monthly BIWF trawl survey data were reviewed to determine the extent to which the NEFSC trawl surveys, which are limited to spring and fall, may miss intraannual biomass peaks. The monthly means from seven years are plotted in Figure B-3 (REFE area) and Figure B-4 (REFS area) for the species of primary commercial and recreational interest. Monthly variation in catch rates was observed at a relatively fine spatial scale (i.e., between the two reference sites) for some species in the BIWF trawl survey, such as windowpane flounder and little skate, which illustrates the advantages that can be gained by using multiple reference sites to monitor changes in abundance over time.

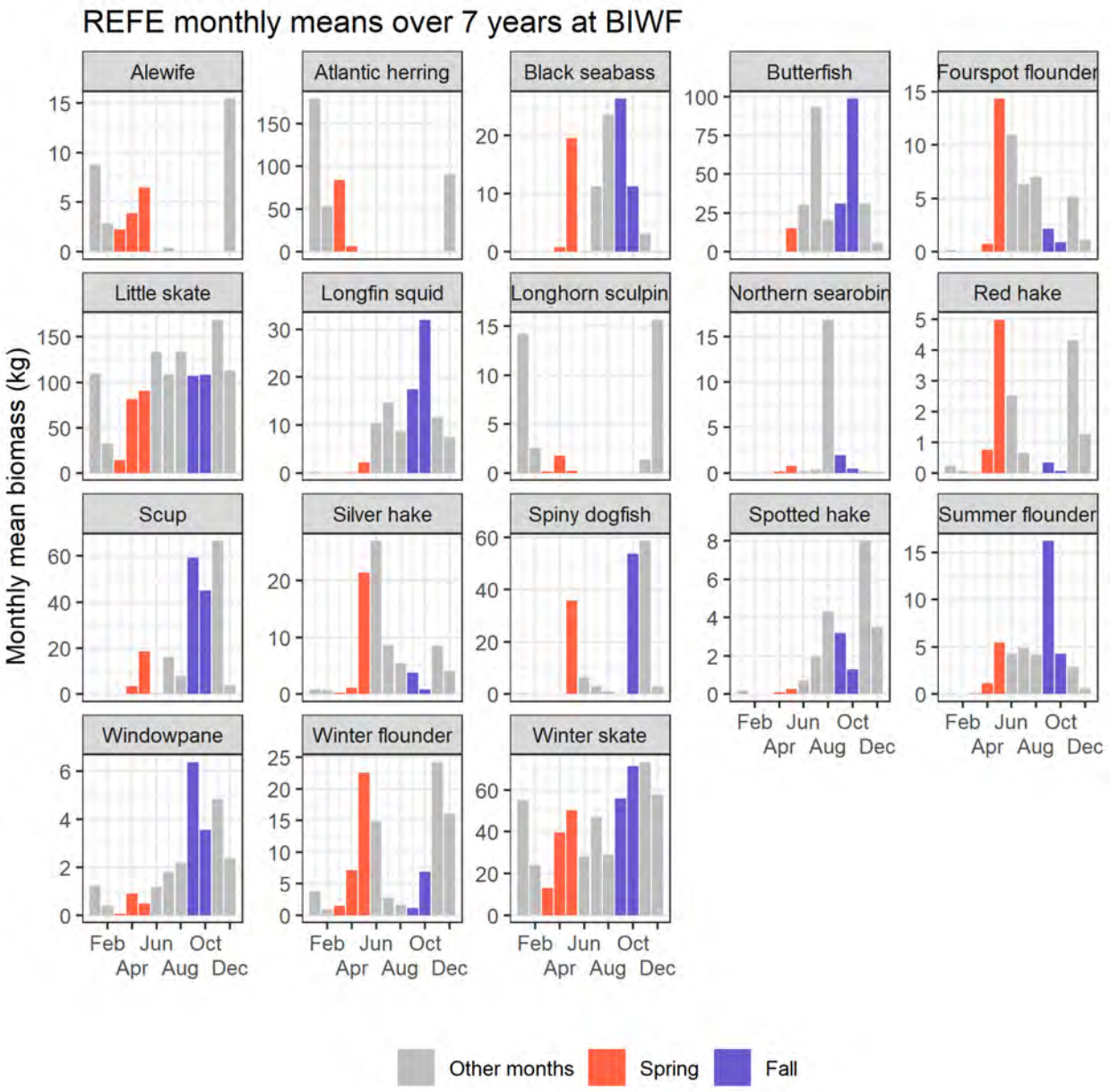


Figure B-3. Monthly mean biomass (kg) averaged over seven years (from October 2012 to September 2019) for dominant species from the eastern reference area (REFE) from the BIWF trawl survey monitoring. The months that were also sampled in the NEFSC trawl survey are colored orange (spring) and blue (fall).

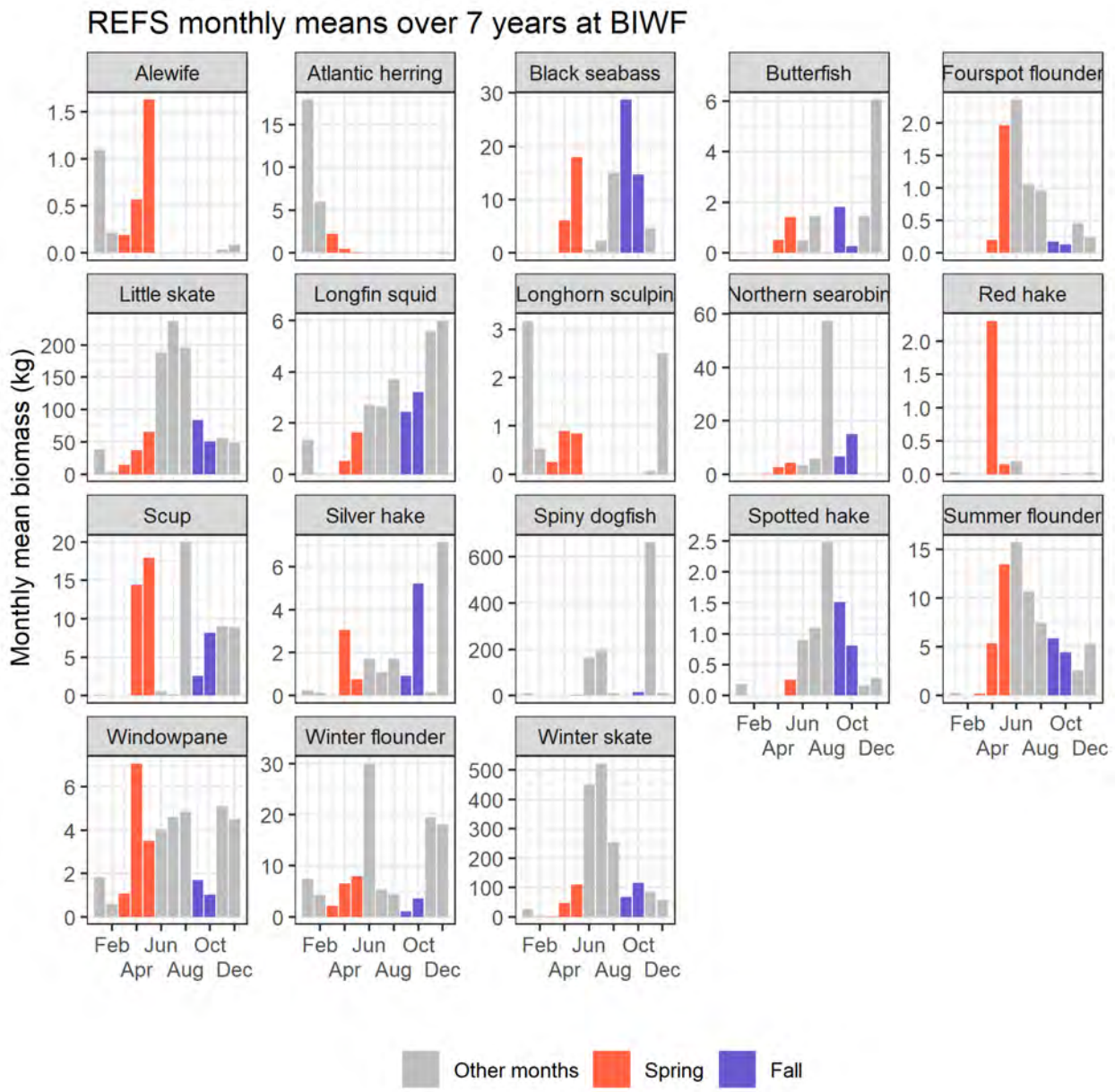


Figure B-4. Monthly mean biomass from October 2012 to September 2019 (averaged over seven years) for dominant species from the southern reference area (REFS) from the BIWF trawl survey monitoring. The months that were also sampled in the NEFSC trawl survey are colored orange (spring) and blue (fall).

3.2 Reference Effect Sizes

Using the NEFSC and BIWF reference datasets, the proportional change in mean annual biomass (averaged across seasons) between subsequent 2-year time periods, was calculated as:

$$h = (\bar{x}_{2,3} / \bar{x}_{0,1} - 1) \quad \text{[Eq. 2]}$$

where

$\bar{x}_{0,1}$ = The two year mean from all seasons in years ***i*** and ***i+1.***

$\bar{x}_{2,3}$ = The two year mean from all seasons in years ***i+2*** and ***i+3.***

For [Eq. 2] note that for the NEFSC dataset, ***i***= 2010 through 2014, the annual means were calculated from data from two seasons per year, and where ***i*** =2014, the mean from 2014 and 2015 was compared to mean from 2016 and 2018 (due to incomplete sampling in 2017). For BIWF REFE and REFS datasets, ***i***= 2012 through 2015, and the annual means were calculated from data from four seasons per year (the months January, April, July, and September were subsampled from the monthly time series).

The ranges of relative percent change (proportion x 100) from these extant datasets provide context for generating realistic effect sizes (PC values) to be used in the power calculations. Results are summarized for the NEFSC dataset in Table B-2 and Figure B-5, and for BIWF Reference areas in Table B-2 and Figure B-6. The effect sizes or percent change values [derived from Eq. 2] have a natural lower bound of -100%, and an unlimited upper bound.

Table B-2. Summary of effect sizes as percent change (100 x Eq. 2) by species for reference area datasets from NEFSC and BIWF (results sorted by median value).

	NEFSC (n=9)			BIWF Reference Areas (n=8)		
	Minimum	**Median**	**Maximum**	**Minimum**	**Median**	**Maximum**
Species						
Spiny dogfish		n/a		-98%	-85%	7250%
Atlantic herring	-81%	-75%	-41%	-91%	-36%	17%
Yellowtail flounder	-76%	-61%	-35%		n/a	
Longhorn sculpin		n/a		-90%	-60%	-5%
Bluefish	-67%	-39%	837%		n/a	
Winter skate	-78%	-38%	90%	-52%	-16%	105%
Silver hake	-54%	-36%	98%	-50%	812%	1690%
Little skate	-51%	-27%	58%	-46%	-29%	56%
Windowpane flounder	-42%	-23%	94%	-56%	-31%	42%
Alewife		n/a		-75%	-22%	1170%
Fourspot flounder		n/a		-56%	-20%	41%
Butterfish	-53%	-15%	663%	-89%	-1%	299%
Scallop	-32%	-11%	497%		n/a	
Goosefish	-21%	1%	165%		n/a	
Longfin squid	-26%	17%	127%	-37%	-14%	3%
Summer flounder	7%	22%	101%	-56%	-16%	73%
Red hake	-32%	33%	78%	-38%	154%	Inf
Scup	-28%	41%	362%	-23%	176%	811%
Winter flounder	-75%	89%	162%	-33%	-5%	25%
Spotted hake		n/a		-62%	175%	1590%
Black sea bass	80%	232%	258%	-71%	47%	629%
Northern sea robin		n/a		62%	334%	2360%
Atlantic mackerel	-100%	458%	Inf		n/a	
Minimum	-100%	-75%	-41%	-98%	-85%	-5%
Median	-51%	-11%	114%	-56%	-15%	105%
Maximum	80%	458%	837%	62%	812%	7250%

n/a=not available. The NEFSC summaries are presented only for those species requested by Orsted from NEFSC. The BIWF summaries are presented for species included in the RI CRMC's Ocean Special Area Management Plan (OSAMP) of recreational and commercial species of concern and/or which had sufficient catch to allow for estimation of relative effect sizes.

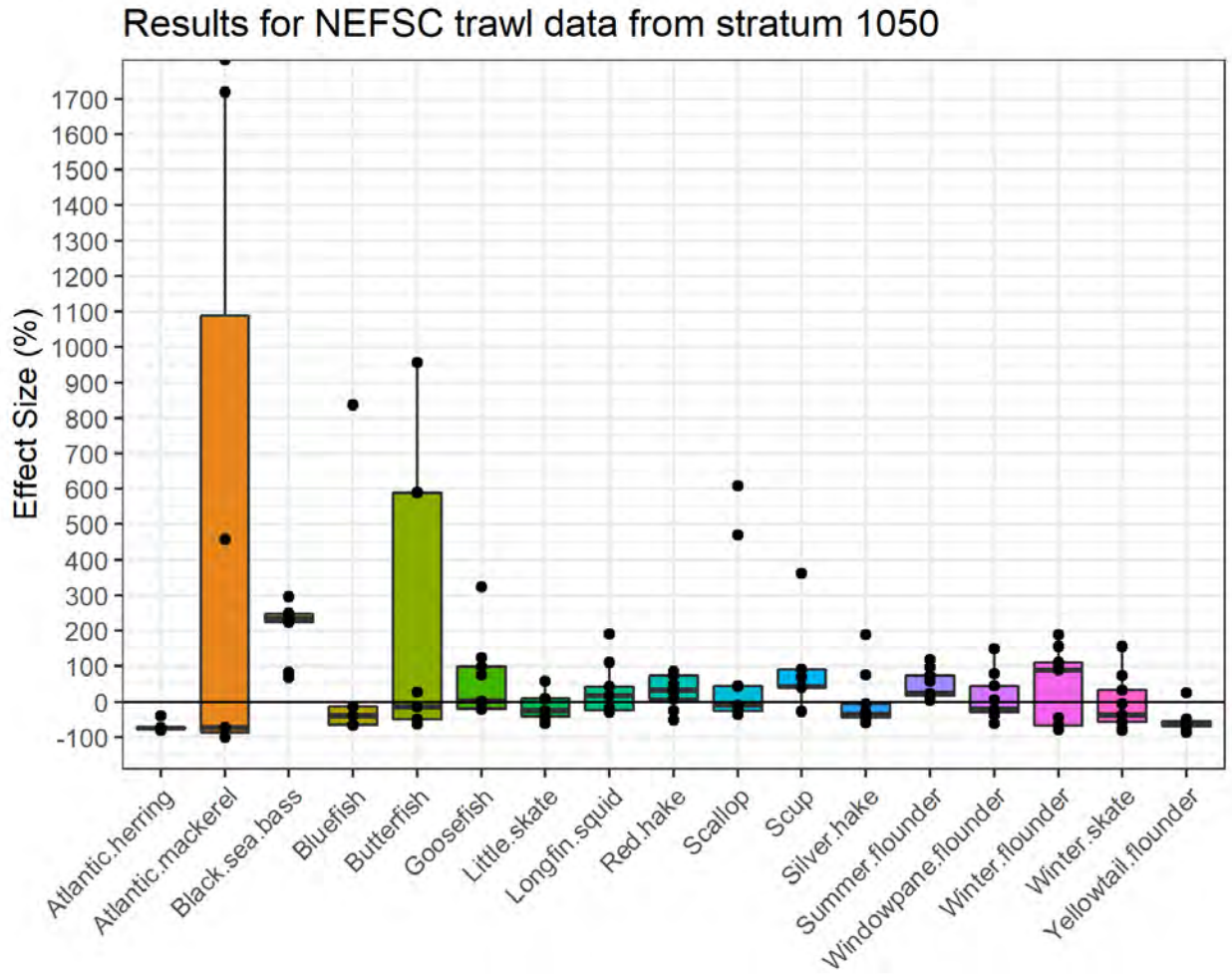


Figure B-5. Boxplots showing the distribution of effect sizes as relative percent change (100 x Eq. 2) by species for NEFSC dataset (2010 – 2018). Scale of y-axis was truncated to -100% to 1700% to allow greater distinction of the values less than zero.

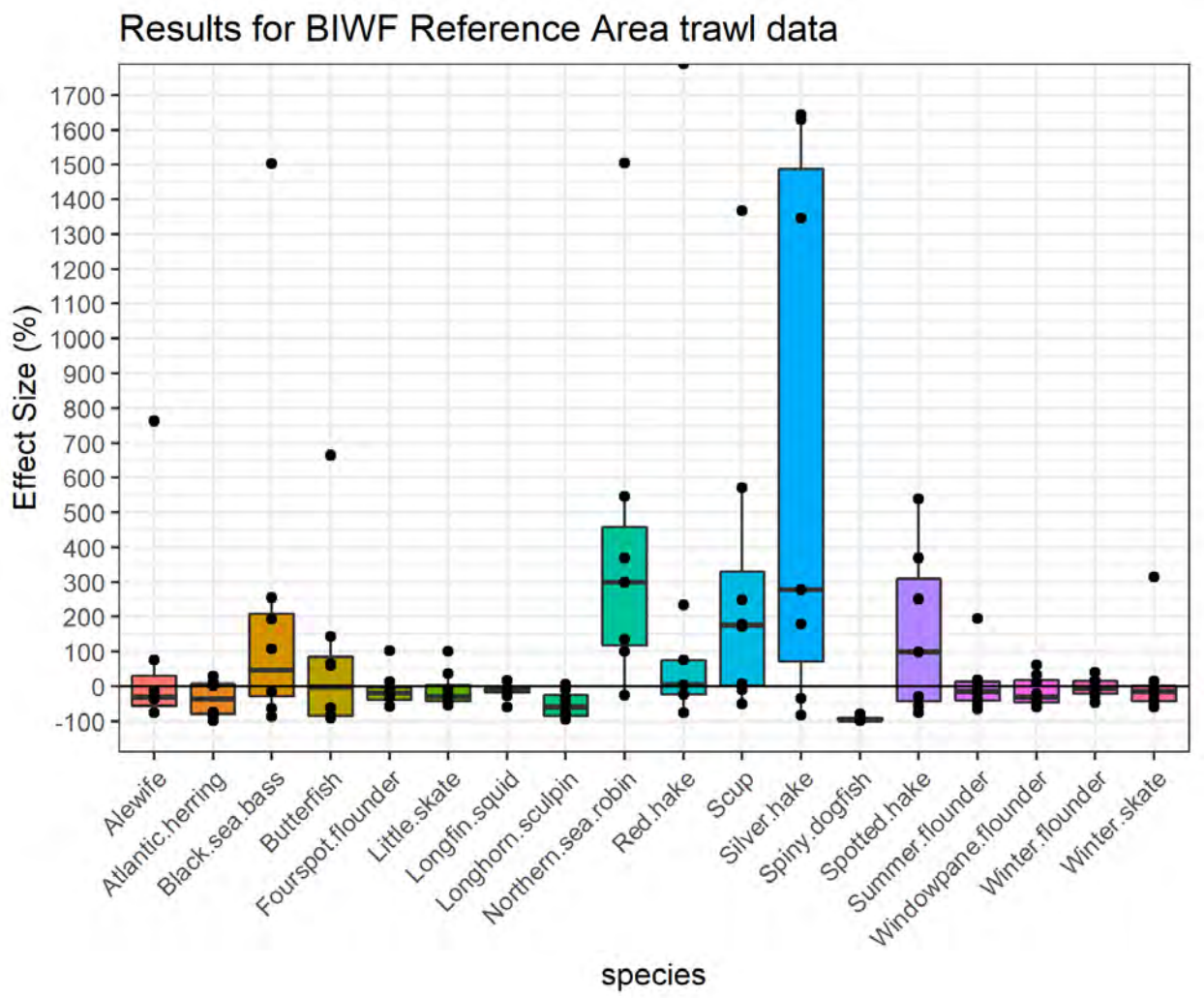


Figure B-6. Boxplots showing the distribution of effect sizes as relative percent change (100 x Eq. 2) by species for BIWF reference areas (2012/2013 – 2018/2019). Scale of y-axis was truncated to -100% to 1700% to allow greater distinction of the values less than zero.

Over the nine-year period for the NEFSC dataset, nine of the 17 species had decreases in more years than increases (median values < 0) with median relative percent decreases ranging from -11% to -75%. For the BIWF Reference area dataset over the seven-year period 12 of the 18 species had decreases in more years than increases, with median relative percent decreases ranging from -1% to -85%.

The results demonstrate the substantial interannual variability that can occur for many species in the region, particularly when survey data are analyzed on a fine spatial scale (which reduces the number of observations). The data suggest that it may be reasonable to attempt to detect effect sizes on the order of 50% for some species (e.g., longfin squid), but for other species that display greater interannual variability (e.g., butterfish) detecting anything smaller than a 50% relative change may not be possible given practical constraints and the underlying natural variability in abundance and availability associated with those populations.

3.3 Coefficient of Variation

Catch (kg) per tow is naturally bounded by zero and the distribution tends to be skewed with most catches around the median value and large catches in a few tows, approximating a lognormal distribution. The NEFSC biomass data from replicate tows within a single season in Stratum 1050 were too sparse to adequately test this (n=4 to 5 per season within Strata 1050), but the data generally fit this description. For the lognormal distribution, the standard deviation (SD) is proportional to the mean and the coefficient of variation (CV = SD/mean) on the original scale is used to summarize variability in catch rates independent of the mean. A summary of the seasonal CV values for the NEFSC dataset is shown in Table B-3. For conservative sample size estimates in the power analyses (Section 4.0), the observed range of median to maximum CV values across seasons, years, and species were used (0.8 to 2.2)

Table B-3. Summary of seasonal variance estimates for catch (biomass, kg) for the individual fish and invertebrate species from NEFSC trawl survey in Stratum 1050 that were used in this analysis.

		Seasonal Coefficients of Variation (CVs) Summarized across Seasons and Years		
Species	**Number of Seasons with Catch**	**Minimum**	**Median**	**Maximum**
Longfin squid	10	0.4	0.8	1.4
Little skate	17	0.4	0.9	1.6
Summer flounder	17	0.4	0.9	2.2
Windowpane flounder	16	0.3	1.0	1.8
Winter skate	17	0.4	1.1	1.9
Winter flounder	17	0.8	1.2	1.8
Butterfish	11	0.6	1.3	2.0
Atlantic herring	12	0.8	1.3	2.2
Black sea bass	13	0.6	1.4	2.2
Silver hake	17	0.8	1.4	2.1
Scallop	17	0.8	1.5	2.2
Yellowtail flounder	16	0.6	1.5	2.2
Scup	10	0.7	1.6	2.2
Red hake	16	0.8	1.7	2.2
Atlantic mackerel	5	1.7	1.8	2.0
Goosefish	14	0.9	1.8	2.2
Bluefish	6	1.5	2.1	2.2
Minimum	5	0.3	0.8	1.4
Median	16	0.7	1.4	2.2
Maximum	17	1.7	2.1	2.2

4.0 Power Analysis

4.1 The Study Design and Model

An asymmetrical BACI design was tested in this power analysis, with the design variables as specified in Table B-4. For comparison, a symmetrical BACI (i.e., one impact and one reference area) was evaluated for power using a limited scenario (i.e., a single CV).

Table B-4. Design for Sunrise Wind trawl survey power simulation study

Set study design variables
• Impact Areas = 1 impact area
• Reference Areas = 2 control/reference areas
• Habitat Strata = 1
• Frequency = four seasons per year
• Number of years Before impact = 2 • Number of years After impact = 2
Variables altered in the power analysis
• Number of replicate (random) trawls per season in each area (n): 5, 10, 12, 14, 16, 20, 30, 40
• Proportional Change (PC) of Impact / Reference : -25%, -33%, -40%, -50%, -70% (Section 3.3) and 0% (for Type I error)
• CVs: 0.8, 1.0, 1.2, 1.4, 1.8, 2.2 (Section 3.4)
• A two-tailed α = 0.10

For a saturated model that estimates the mean catch (kg) for each season, year, and location, the BACI interaction contrast is described as

[Eq. 3]

where

= The two-year log-scale mean biomass per tow (kg) from the Impact area, averaged across four seasons in all years of the ***Period*** (Before or After)***.***

= The two-year log-scale mean biomass per tow (kg) averaged across the two Reference areas, and four seasons in all years of the ***Period*** (Before or After).

4.2 Simulation methods

The power analysis used a simulation approach to generate significance values for a range of CV estimates, effect sizes (PC values), and a range of sample sizes (Table B-4). Given the substantial intraannual variability that is present amongst the fish populations in the region (Figures B-2, B-3, and B-4), accounting for seasonality is important when estimating statistical power. Therefore, seasonality for this four-season sampling design was imposed as two seasons with the same mean catch per tow μ, and the other two seasons having mean 0.25μ (a 75% decrease). Note that this is just one of several permutations that could be used to simulate the seasonal variability that is anticipated to be present in the trawl survey catch rates. The effect size (PC) was imposed on every season during the After period. Note that proportional changes on the original scale become additive changes on the log-scale; consequently, log-scale changes are a function only of the PC value and do not depend on the starting mean value. Code was written in (R Core Team 2020) to conduct the simulations; the R code is included as an addendum to this appendix.

For a given CV, PC, and sample size (n), the following steps were performed m=1000 times:

1. From a log-normal distribution with mean μ and CV, simulate ***n*** values of catch data for 2 seasons in each year of the Before period, for all Impact and Reference areas. Repeat with mean 0.25μ for the other 2 seasons of each year of the Before period, for all Impact and Reference areas.
2. Repeat step 1 for each year of the After period for the two Reference areas.
3. Repeat step 1 for each year of the After period for the Impact area, but with a reduced mean equal to (1+PC)μ for 2 seasons, and mean 0.25 x (1+PC)μ for the other 2 seasons.
4. Fit the saturated model to the log-transformed biomass data (i.e., a separate coefficient for every area-period-season-year).
5. Calculate the BACI interaction contrast, and save the p-value.
6. Repeat m=1000 times for 1000 simulation replicates.
7. Count the number of times out of m that the p-value was < 0.10, and store this simulated power estimate for that combination of CV, PC, and n.

Repeat Steps 1-7 for each combination of CV, PC, and n.

4.3 Results

The simulation power results for a design with one impact and two reference areas are shown in Table B-5 and Figure B-7. Using an asymmetrical BACI design with two reference areas increases the statistical power of the survey design when compared to a BACI approach that relies on a single reference area (Figure B-8).

Table B-5. Simulated power for the BACI interaction contrast within a saturated model (see text) for a range of variance (CV), effect sizes (% change), and sample sizes (n) per season per area, and using a two-tailed α = 0.10 and a design with one impact and two reference areas. The 0% change illustrates the type I error. Results with power 80% and above are shaded.

% Change	Sample Size (n)	CV=0.8	CV=1.0	CV=1.2	CV=1.4	CV=1.8	CV=2.2
0	5	0.10	0.10	0.13	0.12	0.12	0.09
0	10	0.09	0.11	0.10	0.11	0.10	0.10
0	20	0.10	0.11	0.10	0.11	0.09	0.09
0	30	0.11	0.11	0.10	0.09	0.10	0.10
0	40	0.09	0.10	0.09	0.10	0.11	0.09
-25%	5	0.46	0.35	0.29	0.29	0.22	0.20
-25%	10	0.66	0.53	0.49	0.41	0.33	0.31
-25%	20	0.92	0.80	0.73	0.66	0.55	0.48
-25%	30	0.98	0.94	0.86	0.80	0.69	0.62
-25%	40	1	0.96	0.94	0.89	0.79	0.73
-33%	5	0.66	0.54	0.46	0.42	0.35	0.30
-33%	10	0.91	0.80	0.72	0.66	0.54	0.47
-33%	20	1.00	0.97	0.92	0.88	0.79	0.71
-33%	30	1	1	0.90	0.97	0.92	0.86
-33%	40	1	1	1	0.99	0.97	0.94
-40%	5	0.85	0.71	0.63	0.56	0.46	0.43
-40%	10	0.98	0.92	0.88	0.81	0.72	0.63
-40%	20	1	1	0.99	0.97	0.91	0.89
-40%	30	1	1	1	1	0.99	0.96
-40%	40	1	1	1	1	1	0.99
-50%	5	0.97	0.92	0.86	0.80	0.65	0.60
-50%	10	1	1	0.99	0.96	0.91	0.85
-50%	20	1	1	1	1	0.99	0.98
-50%	30	1	1	1	1	1	1
-50%	40	1	1	1	1	1	1
-70%	5	1	1	1	0.99	0.98	0.94
-70%	10	1	1	1	1	1	1
-70%	20	1	1	1	1	1	1
-70%	30	1	1	1	1	1	1
-70%	40	1	1	1	1	1	1

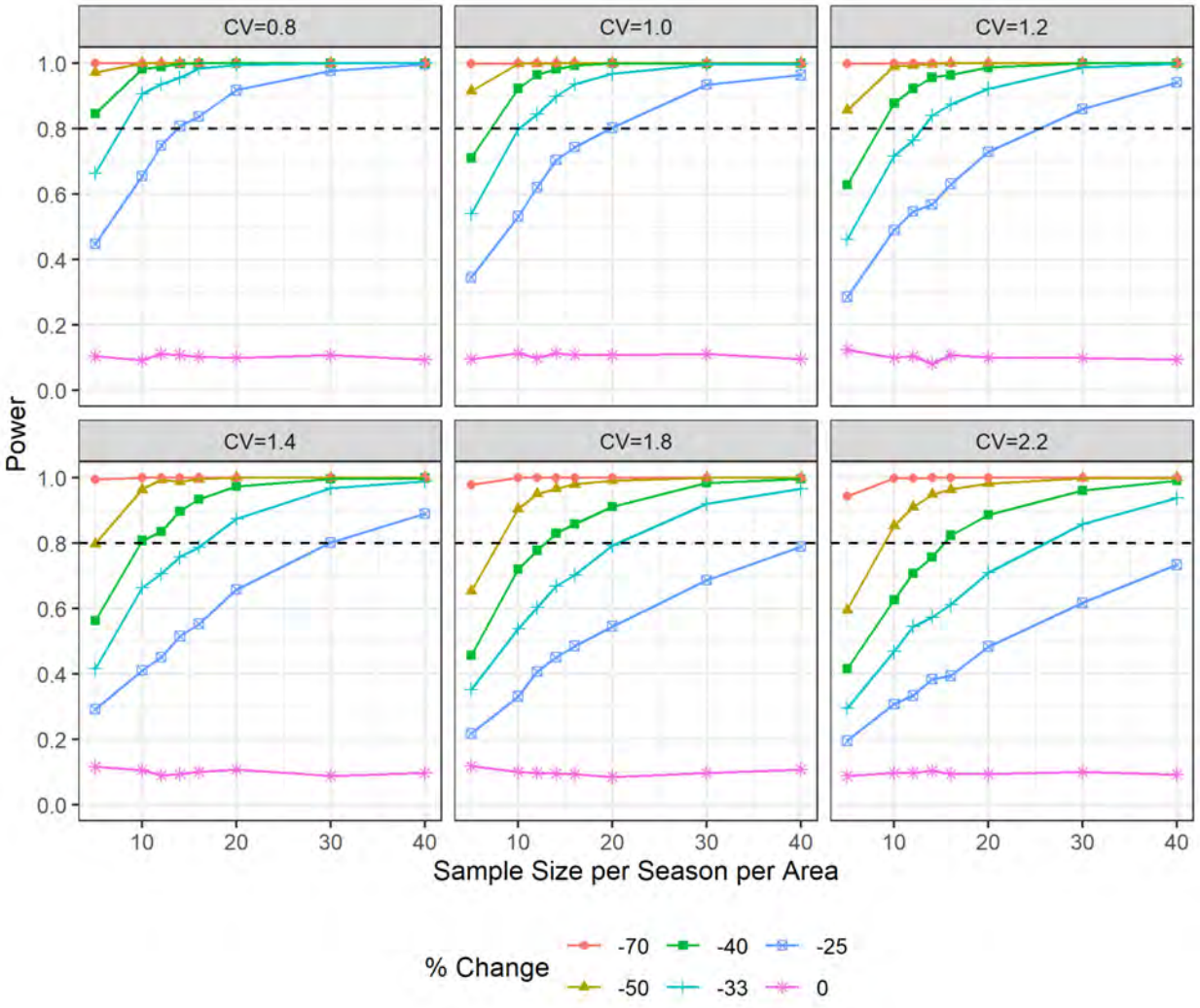


Figure B-7. Power curves for the BACI interaction contrast within a saturated model (see text) for a range of variance (CV), effect sizes (negative % Change) and seasonal sample sizes in each area (n), and using a two-tailed α = 0.10. The 0% change illustrates the type I error.

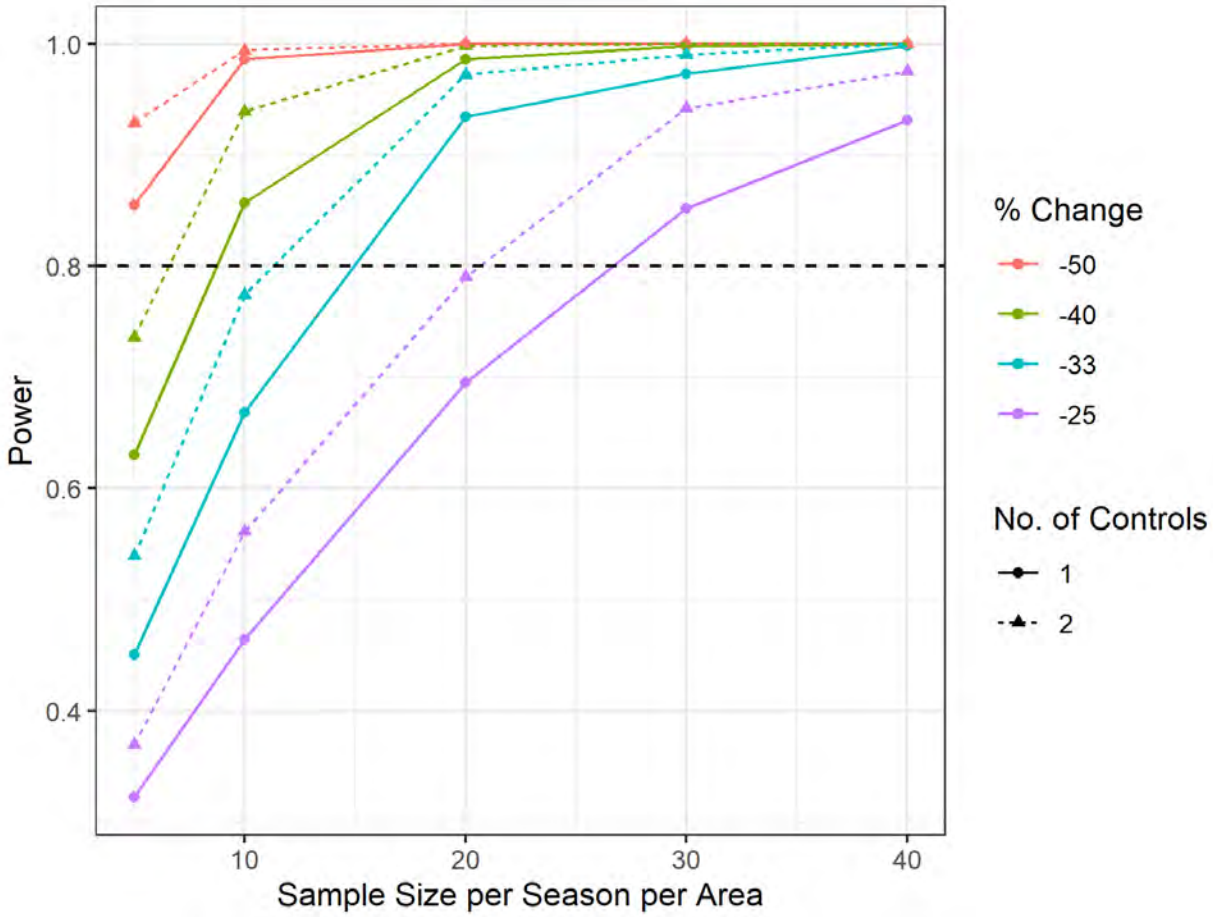


Figure B-8. Power curves to illustrate the differences in power between designs with one or two reference areas for a range of effect sizes (negative % Change), and a single CV = 1.0.

5.0 Summary and Conclusions

- Data from regional trawl surveys demonstrate that fish species in the region generally exhibit moderate to high levels of natural variability (both seasonal and annual), especially when the data are analyzed on a relatively small spatial scale, which limits the number of observations.
- Given the underlying variability in catch rates that will likely be exhibited in the SRWF and RWF trawl survey, it is not practicable to attempt to document a small effect size (e.g., 25% relative decrease) for fish and invertebrate species.
- For species that may be expected to demonstrate lower median CV's (e.g., 0.8-1), a seasonal sampling intensity of 10 tows/area would yield >80% power of detecting an effect size of 33% relative decrease or greater.
- For species that may be expected to demonstrate higher median CV's (e.g., 1.2 – 1.4), a seasonal sampling intensity of 10 tows/area would yield >80% power of detecting an effect size of 40% relative decrease or greater.
- For species that demonstrate higher variability in trawl survey catch rates (e.g., CVs > 1.4) a seasonal sampling intensity of 10 tows/area would only be capable of detecting larger changes in catch rates (e.g., $\geq$50% relative decrease).
- Including a second reference site improves the statistical power of the design for a given level of sampling intensity.
- This power analysis will be re-visited after the first year of the trawl survey. The observed CV values will be evaluated to determine whether sampling intensity needs to be modified to achieve the desired level of statistical power.
- Simulation results indicate that taking conservatively higher sample sizes in the first year and adapting to a lower sampling effort in subsequent years (e.g., 15 tows the first year and 10 tows in subsequent years) results in a marginal increase in power (i.e., power increases from 80% to 81% for CV=1 and PC=-33%) compared to sampling 10 tows in every year. On the other hand, taking fewer samples in the first year and adapting to greater sampling effort in subsequent years (e.g., 10 tows the first year and 15 tows in subsequent years) results in a small decrease in power (i.e., power is reduced from 93% to 90% for CV=1 and PC=-33%) compared to sampling 15 tows every year.

6.0 References

Durlak, J.A. 2009. How to Select, Calculate, and Interpret Effect Sizes, Journal of Pediatric Psychology 34(9) pp. 917–928.

Politis PJ, Galbraith JK, Kostovick P, Brown RW. 2014. Northeast Fisheries Science Center bottom trawl survey protocols for the NOAA Ship Henry B. Bigelow. Northeast Fish Sci Cent Ref Doc. 14-06; 138 p. Online at: https://doi.org/10.7289/V5C53HVS

R Core Team. 2020. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/

Wilber, D., L. Read, M. Griffin, and D. Carey. 2020. ***Block Island Wind Farm Demersal Fish Trawl Survey Synthesis Report – Years 1 to 6, October 2012 through September 2018.*** Technical report prepared for Deepwater Wind, Providence, RI. 80 pp.

APPENDIX C – OUTREACH MATERIALS FOR THE HMS RECEIVER ARRAY

Acoustic Telemetry Study for Highly Migratory Species

Who is doing this study?

- Orsted is funding researchers from the New England Aquarium and Inspire Environmental to carry out a multi-year acoustic telemetry study for Highly Migratory Species.

What species are being studied?

- Acoustic transmitters are being used to track Highly Migratory Species including blue sharks, shortfin mako sharks, and bluefin tuna. The movements of tagged animals will be tracked using a network of acoustic receivers (blue dots on chart).

Why is this study being done?

- This study will investigate the behavior, residence time, and movements of Highly Migratory Species in Orsted's South Fork Wind, Revolution Wind, and Sunrise Wind development areas to understand if offshore wind development leads to changes in the behavior and distribution of tagged fish.

How does this tracking technology work?

- Transmitters emit a coded ping every couple of minutes that can be heard when a tagged fish is within about 3,000 feet of an acoustic receiver. The receivers record the date and time when they hear the pings from each tag. Information about fish presence and movements within and throughout the study area can later be determined when data are downloaded from all of the receivers.

When will the receivers be put out, and how long will they be left out for?

- The acoustic receivers will be deployed in May or June of 2022. The receivers will remain in the water, year-round, through at least the end of 2026. This long duration study is meant to collect data before, during, and after the construction of the offshore wind farms. The project team will retrieve and redeploy the receivers two or three times a year so the data can be downloaded and the batteries on the acoustic receivers can be changed.

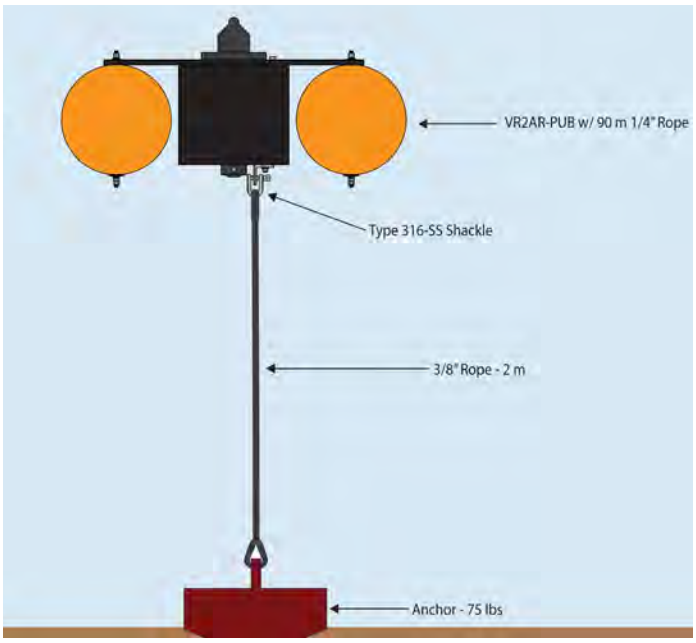
How are the receivers moored to the bottom?

- The Innovasea receivers will be deployed using ropeless technology (acoustic release receivers) to minimize risks to marine mammals and other protected species. The receivers will be rigged in a pop-up canister that suspends about 6 feet off the bottom. The canister will be anchored in place with a 75-pound pyramid anchor (see picture below). At the end of the study, all gear (acoustic receivers and anchors) will be removed from the water completely.

Where will the receivers be located?

- The research team intends to place the receivers strategically to avoid interaction with commercial fishing gear, particularly mobile gear fishing effort. For example, receivers will be located in hard bottom habitats or out of popular mobile gear fishing locations.

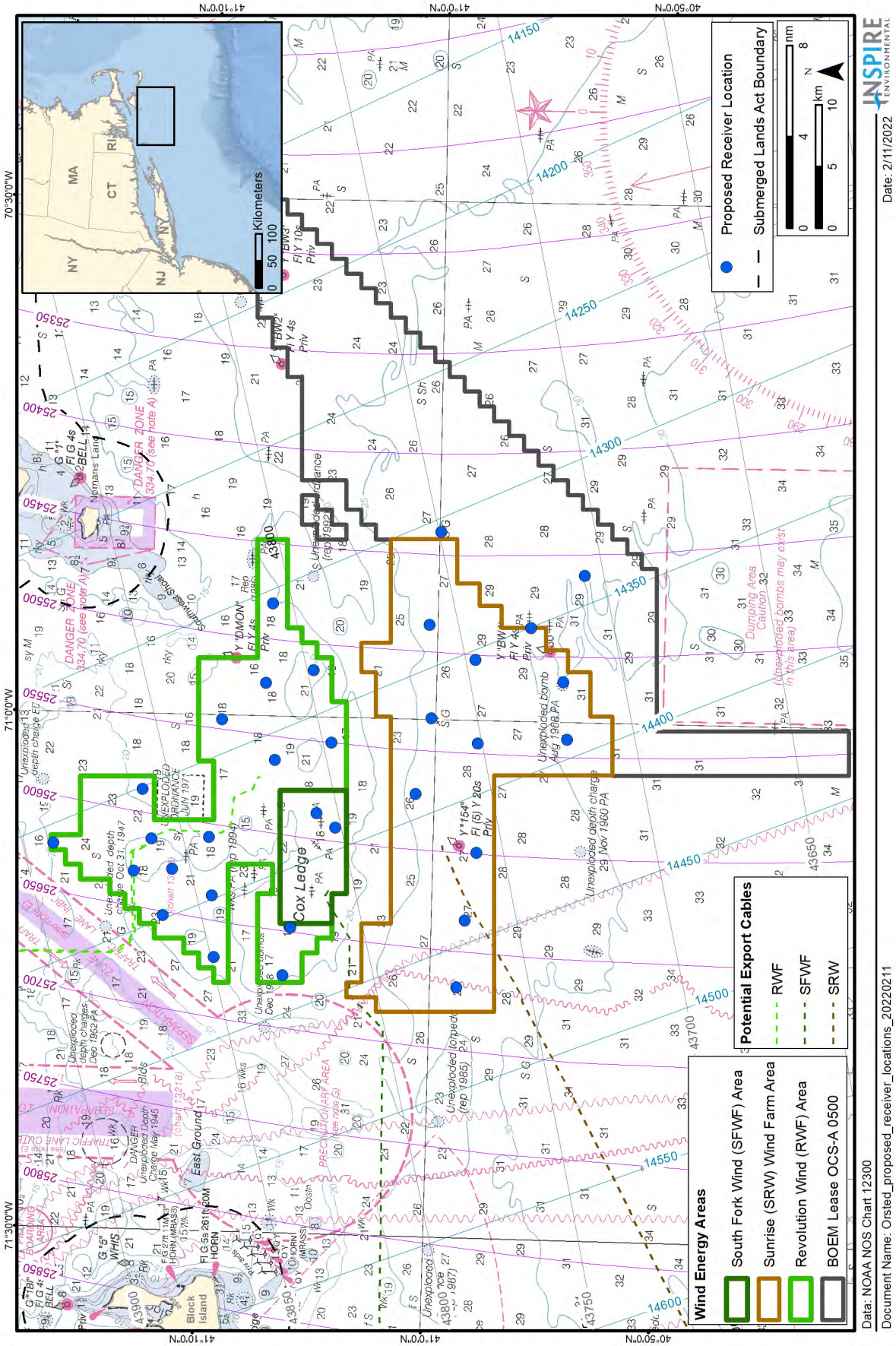
Appendix B – Power Analysis



Who can I Contact for more information?

- Jeff Kneebone, New England Aquarium, jkneebone@neaq.org, 617-226-2424 (office), 603-969-2138 (cell)
- Brian Gervelis, Inspire Environmental, brian@inspireenvironmental.com, 401-608-2735
- Greg DeCelles, Orsted, grede@orsted.com, 857-408-4497

Appendix B – Power Analysis



APPENDIX D – OUTREACH MATERIALS FOR THE SUNRISE WIND EXPORT CABLE RECEIVER ARRAYS

Sunrise Wind Export Cable Acoustic Telemetry Study

Who is doing this study?

- Orsted is funding researchers from the Stony Brook University and Cornell Cooperative Extension to carry out a multi-year acoustic telemetry study for several species along the south coast of Long Island.

What species are being studied?

- Acoustic transmitters are being used to track several species including sandbar sharks, dusky sharks, sand tiger sharks, winter skates, smooth dogfish, lobsters, and horseshoe crabs. The movements of tagged animals will be tracked using a network of acoustic receivers.

Why is this study being done?

- This study will investigate the behavior, residence time, and movements tagged animals along the Sunrise Wind Export Cable route to understand if the installation and operation of the cable leads to changes in the behavior and distribution of marine organisms.

How does this tracking technology work?

- Transmitters emit a coded ping every couple of minutes that can be heard when a tagged animal is within about 3,000 feet of an acoustic receiver. The receivers record the date and time when they hear the pings from each tag. Information about fish presence and movements within study area can later be determined when data are downloaded from all of the receivers.

When will the receivers be put out, and how long will they be left out for?

- The acoustic receivers will be deployed in June or July of 2022. The receivers will remain in the water, year-round, until 2027. This long duration study is meant to collect data before, during, and after the installation of the Sunrise Wind Export Cable. The project team will retrieve and redeploy the receivers two or three times a year so the data can be downloaded and the batteries on the acoustic receivers can be changed.

How are the receivers moored to the bottom?

- The Innovasea receivers will be deployed using ropeless technology (acoustic release receivers) to minimize risks to marine mammals and other protected species. The receivers will be rigged in a pop-up canister that suspends about 6 feet off the bottom. The canister will be anchored in place with a 75-pound pyramid anchor (see picture on third page). At the end of the study, all gear (acoustic receivers and anchors) will be removed from the water completely.

Where will the receivers be located?

- The receivers will be located at two locations along the route of the Sunrise Wind Export Cable (see the following charts). The research team intends to place the receivers strategically to avoid interaction with commercial fishing gear, particularly mobile gear fishing effort.

What outreach has been done for this project?

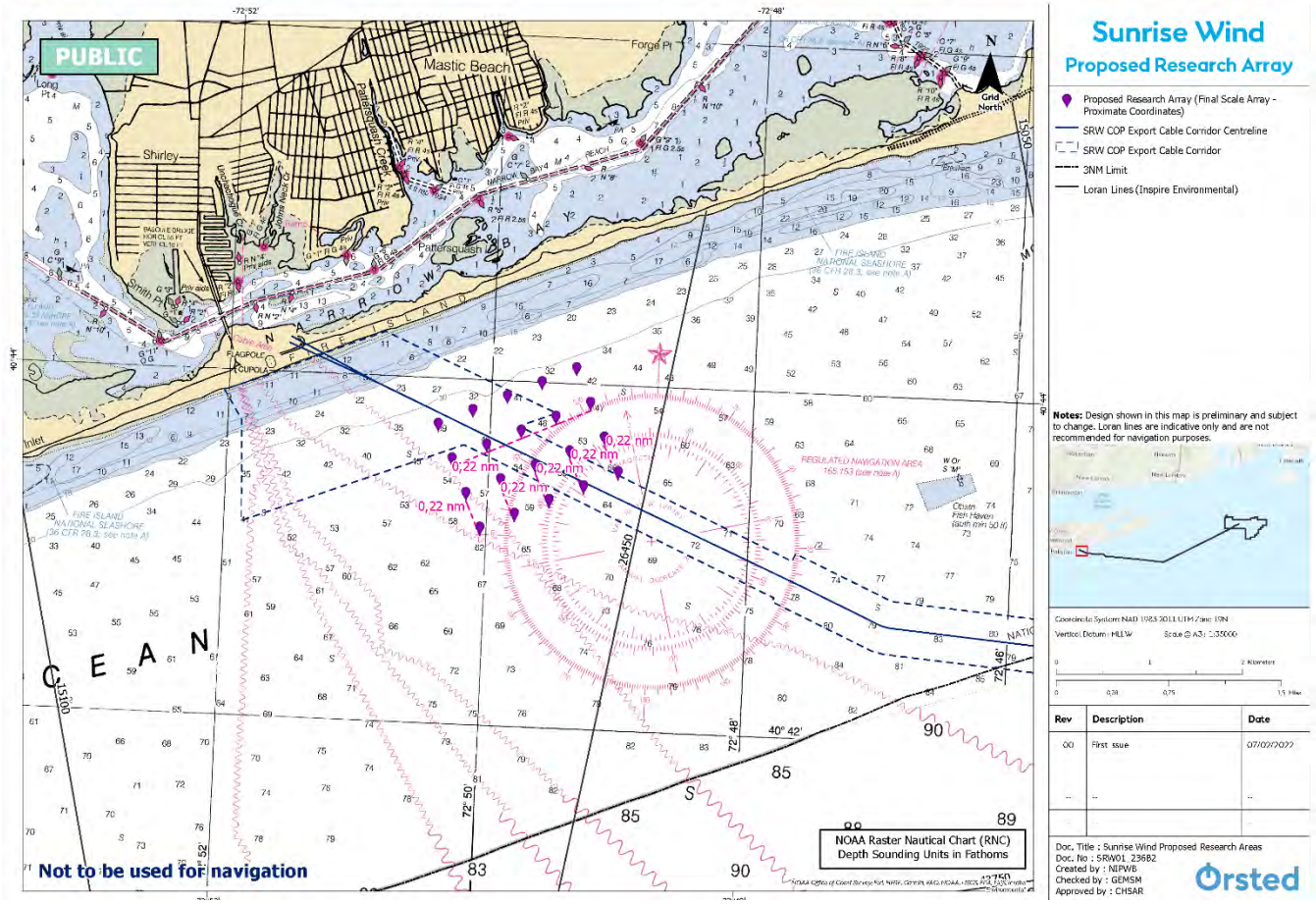
- Starting last summer, Orsted has met with several state and federal resource agencies to discuss the scope and duration of this monitoring study.
- Fisheries Liaisons from the Orsted Marine Affairs team have been meeting with members of the commercial fishing industry that fish in this area to gather feedback on the proposed locations of these receiver arrays. That outreach will continue in the coming months in order to minimize the potential for interactions between mobile gear fishing effort and the scientific monitoring equipment.

Who can I Contact for more information?

- Bradley Peterson, Stony Brook University, bradley.peterson@stonybrook.edu, 631-632-5044
- Matthew Sclafani, Cornell University Cooperative Extension, ms332@cornell.edu
- Greg DeCelles, Orsted Fisheries Science Specialist, grede@orsted.com, 857-408-4497
- Julia Prince, Orsted Fisheries Liaison for New York, julpr@orsted.com, 857-348-3263

Proposed locations for the ‘near-shore’ receiver array

Appendix B – Power Analysis



Appendix B – Power Analysis

Proposed locations for the 'offshore' receiver array

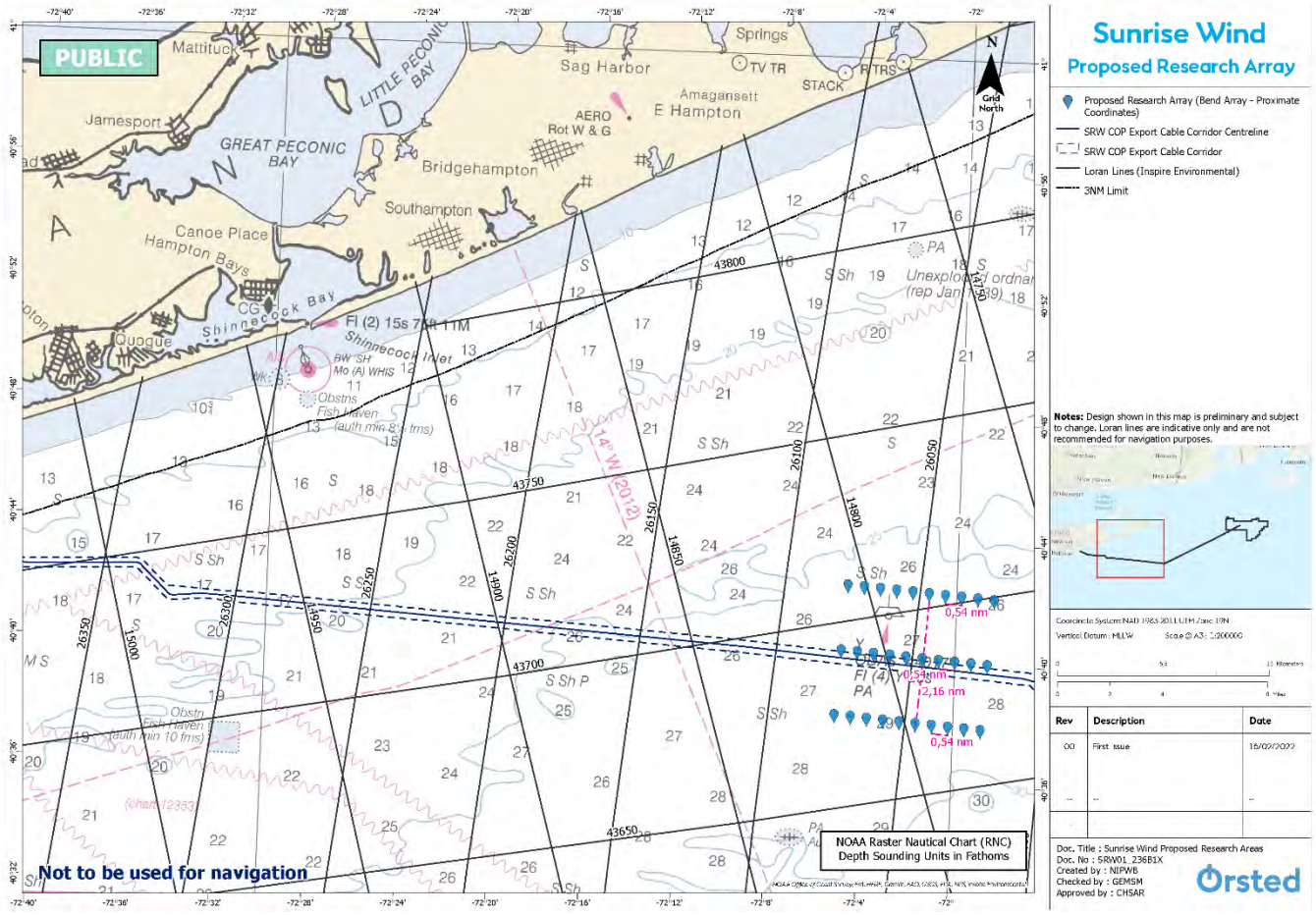
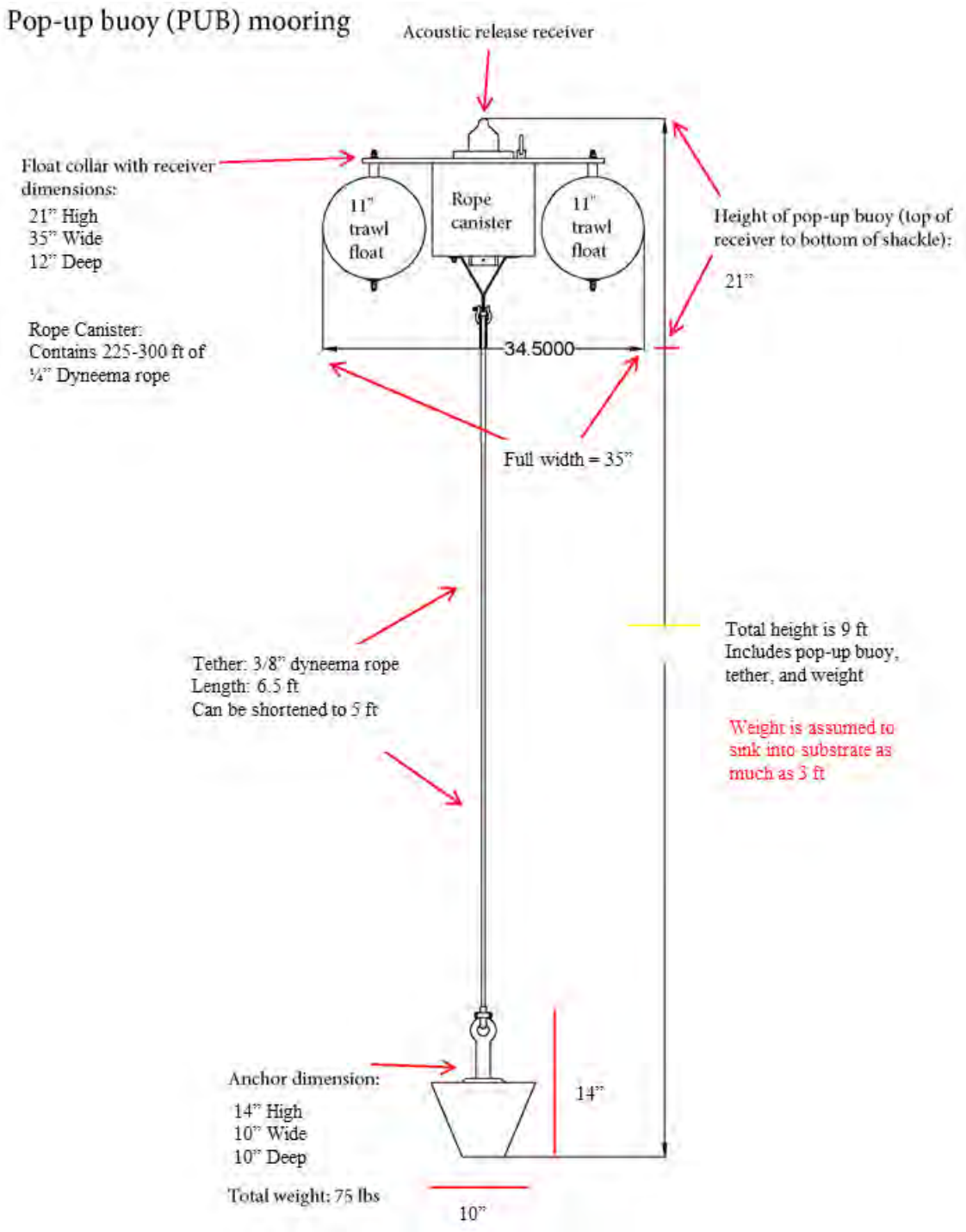


Diagram of an acoustic receiver with the pop-up buoy mooring



APPENDIX P

INVASIVE SPECIES MANAGEMENT PLAN (ISMP) SPECIFICATIONS

APPENDIX P

INVASIVE SPECIES MANAGEMENT PLAN (ISMP) SPECIFICATIONS

An "Invasive Species" (IS) is a species that is non-native to the ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. 6 NYCRR Part 575, ***Prohibited and Regulated Invasive Species***, was adopted in July 2014, to "restrict the sale, purchase, possession, propagation, introduction, importation, and transport of invasive species in New York". The purpose of this Invasive Species Management Plan (ISMP) is to describe the procedures that will be used to help prevent the introduction of new and spread of existing regulated and prohibited invasive plant species as listed in part 575 within the limits of disturbance (LOD) due to construction of the Project.

Purpose and Goals of the Plan

An ISMP shall at a minimum identify invasive species known or found on the project site, describe the methods which will be used to minimize the spread and expansion of invasive species found on site, and describe the methods which will be used to prevent introduction of new invasive species. The ISMP shall include baseline surveys, construction best management practices, post-construction monitoring and an adaptive management strategy plan.

Baseline Invasive Species (IS) Survey

1. During the development of the EM&CP, a **Pre-Construction Baseline Survey** shall be conducted during the growing season. This survey shall serve as a baseline for the preparation of the draft invasive Species Management Plan. If preconstruction surveys are completed at different times or as part of different phases, the results of the surveys will be incorporated into one ISMP. As the ISMP is revised to include surveys or survey updates the Certificate Holder shall evaluate, in consultation with the New York State Department of Environmental Conservation (NYSDEC), Department of Public Service (DPS), and New York State Department of Agriculture and Markets (NYSAGM), whether the results of the surveys also require revisions to the Adaptive Management Plan and the special and high concern species list.

2. The entire Limits of Disturbance (LOD) including permanent and temporary off-ROW access roads shall be surveyed for IS plants as identified in 6 NYCRR Part 575.

3. The survey shall include qualitative observations for IS spread potential from adjacent properties and land use (i.e., IS dominated adjoining property, private off-site access roads that cross the ROW) shall be documented.

4. The preferred survey protocol is for data to be collected in a format which can be uploaded into the statewide database *iMapInvasives*[1].

[1] iMapInvasives is New York State's on-line, all-taxa invasive species GIS based data management system used to assist in the protection of the state's natural resources from the threat of invasive species. It is managed by the New

a. An existing mobile application is available to facilitate data collection.

b. Alternately, a custom ArcGIS collector application can be developed by NYSDEC or an alternative protocol may be proposed for acceptance by NYSDEC.

c. The data collection protocol shall allow for:
   - Point data collected in the field on GPS-enabled devices;
   - Confidentiality controls to restrict information distribution. This coding hides the data from public view and is only visible to key state agency staff and PRISM[2] coordinators focused on IS work with funding from the state. Those with access to this data have signed a non-disclosure agreement.

Construction Best Management Practices (BMPs)

Construction BMPs shall be implemented for all IS in all LOD not just jurisdictional areas and at a minimum shall include:

1. Contractor/Subcontractor/Employee Training on cleaning and other IS management procedures;

2. Inspection of Construction Materials and Equipment by trained staff;

3. Minimizing Ground Disturbance in IS dominated areas;

4. Proper Clearing and Disposal Practices (*i.e., cut and leave in dominated area or dispose off-site in landfill-incinerator or approved disposal site*);

5. Equipment Cleaning; and

6. Restoration.

IS Propagation

IS Propagation shall be prevented by, among other stated techniques, the following:

1. Preparing ROW travel routes to prevent IS spread through contact with equipment/vehicles by any practical combination of matting, IS burial, clean fill cover or IS eradication; and/or

2. Providing cleaning stations for equipment/vehicles whenever leaving IS dominated areas along ROW; and/or

3. Other mutually agreeable practices.

York State Natural Heritage Program (NYNHP) in partnership with the New York State Department of Environmental Conservation.

[2] (PRISM) Partnerships for Regional Invasive Species Management. PRISMs coordinate invasive species management functions and the NYSDEC has contracted with eight PRISMs across the State.

Post-Construction Monitoring

1. Post construction surveys shall be conducted in all LOD, both within the ROW and off-ROW areas and access roads;

2. A post construction survey of IS shall be conducted in all temporary off-ROW access road areas during the final SWPPP inspections;

3. A post construction survey of IS shall be conducted in all ROW LOD areas, including permanent access roads, after the second full growing season from final SWPPP signoff;

4. All post-construction surveys shall use the same IS Survey Protocols used during the baseline pre-construction IS survey;

5. Upon completion of the post-construction surveys, a final report shall be prepared and submitted to the NYSDEC, NYSAGM and DPS. The final report shall discuss whether the goals of the ISMP have been achieved and whether any additional post-construction monitoring may be warranted based on whether an expansion of identified IS of Special Concern (ISSSC) or High Concern (ISHC) as a result of construction are present, as defined in the Adaptive Management Strategy (AMS) discussed below. If the post construction monitoring report shows the aerial extent of ISSC or ISHC has expanded as defined in the AMS as a result of construction of the Project, the final report shall include a Final Adaptive Management Strategy for achieving the goals of the ISMP. DPS, NYSAGM and NYSDEC will review the final report and DPS, in consultation with the other agencies, will determine whether the goals of the post construction monitoring have been achieved or, if applicable, whether the Final Adaptive Management Strategy must be implemented.

Adaptive Management Strategy Plan

The initial ISMP will include an Adaptive Management Strategy Plan prepared in consultation with and accepted by NYSDEC, DPS and NYSAGM and, at a minimum must include the following elements:

1. A project specific list of Prohibited Invasive Species pursuant to 6 NYCRR Part 575 divided into two sub-lists for which management and control will be required (these lists to be generated by NYSDEC in consultation with DPS and NYSAGM):

    a. Invasive Species of Special Concern (ISSC), being comprised of *Prohibited* IS[3] known to be present in the project area and for which NYSDEC has deemed control is necessary such that there is no expansion as defined below. This list will be generated following results of pre-construction surveys and an analysis of regional threat, (e.g. PRISM Tier rankings).

[3] See 6 NYCRR Part 575.3.

b. Inclusion of a project specific list of Invasive Species of High Concern[4] (ISHC), being those IS not present in the project area, but which if newly identified in post-construction monitoring, eradication is required. This list will include *Prohibited* IS with the highest management concern, e.g. Giant Hogweed.

2. Management of "expansion":
    a. ISSC that have expanded under the following terms must be controlled.
    b. ISHC that have been newly identified must be eradicated.
    c. In comparing progressive monitoring data of ISSC, expansion may be defined in terms of categorical jump in *iMapInvasives* size categories, described as follows:

    iMapInvasives size categories:
        - New and distinct occurrence
        - Up to 10 sq. ft.
        - Up to 0.5 acre
        - Up to 1.0 acre
        - More than 1.0 acre

3. In consultation with NYSDEC, DPS and NYSAGM, a discussion of possible adaptive management strategies and control measures (e.g., eradication) and where and when they may be required if the post-construction survey identifies an expansion of ISSC or ISHC in LOD areas caused by construction. This should include consideration of IS phenology, control methodology (mechanical techniques, pesticide use etc.) and control objectives.

4. Discussion of conditions that may necessitate additional post construction monitoring and the extent and duration of such extended monitoring considering ongoing Long-Range Vegetative Management Plan practices.

Upon completion of the post-construction monitoring surveys, if the post construction monitoring report shows the aerial extent of ISSC or ISHC has expanded as defined in the Adaptive Management Strategy as a result of construction of the Project, then DPS, NYSAGM and NYSDEC will review the final report and DPS, in consultation with NYSDEC and NYSAGM, will determine whether the goals of the post construction monitoring have been achieved or, if applicable, whether a Final Adaptive Management Strategy Plan must be implemented.

***

[4] To be defined by NYSDEC in consultation with the Certificate Holder, DPS and NYSAGM. The list would be selected from the 6 NYCRR 575 species list.

APPENDIX Q

SCOPE OF BETHNIC RECOVERY STUDY

APPENDIX Q

SCOPE OF BETHNIC RECOVERY STUDY

General Approach to Documenting Effects Associated with HDD Exit Location Construction

- If HDD exit excavation and side placement of excavated material occurs during construction, a focused benthic study would be designed to investigate benthic recovery following disturbance
- Sampling to assess recovery of the infaunal community following sediment side placement and HDD exit excavation will be conducted during the same post-construction benthic surveys described in the NY State Water Benthic Monitoring Plan (Appendix to the Conditions)
- Before-After-Control-Impact (BACI) sampling design
- Benthic sampling conducted in 2020 will be used as the pre-construction "before" data

Survey Timeline

- Post-construction data will be collected concurrent with the post-construction sampling described in the NY State Waters Benthic Monitoring Plan
    - Two post-construction survey events (~1 year and 2 years following the start of cable operations)
    - Sampling to occur between August and October, following the start of Cable Operations, for two years

Survey Design

- Three stations will be randomly located in the area where excavated sediments were placed during HDD exit location construction (assumed to be an area about 200 x 200 ft)
- Three stations will be randomly located in the area where the exit pit was constructed and subsequently backfilled
- Three stations will be randomly located at a control site which will be located to the south of the HDD exit pit location away from any potential disturbance attributed to exit pit construction

Sampling Approach

- At each station sediment grab samples will be collected in triplicate for Benthic Community Analysis, as described in the NY State Waters Benthic Monitoring Plan

Data Analysis Approach

- The data will be analyzed as a BACI study design
- This will allow for any natural interannual variability to be accounted for during analysis
- Benthic community analysis metrics including total infaunal abundances, total number of species (alpha diversity), and community composition will be the focus of the data analysis
- These metrics will be compared across the three areas (described in the Survey Design section above) and before and after construction

APPENDIX R

PRIMARY DECOMMISSIONING PLAN OUTLINE

APPENDIX R

PRIMARY DECOMMISSIONING PLAN OUTLINE

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Abbreviations

HDD	horizontal directional drill
Ft	Feet
ICW HDD	Intracoastal Waterway Horizontal Directional Drill
LIPA	Long Island Power Authority
M	Meters
NYS	New York State
NYSDOT	New York State Department of Transportation
OnCS-DC	Onshore Converter Station
ROW	Right-of-way
SRWEC-NYS	Sunrise Wind Export Cable-New York State

ASSUMPTIONS

In addition to other assumptions noted herein, the following key assumptions were utilized to generate the decommissioning cost estimates presented in the Decommissioning Plan:

- Costs are presented in current (2022) dollars using the site cost index for Riverhead, New York (Masterformat City Cost Index 2022).
- Cost estimates include allowances for project labor.
- Market conditions may result in cost variations at the time of contract execution.
- Waste will be disposed at a licensed New York State Department of Environmental Conservation location.
- Onshore, Underground Transmission Line Equipment Outside of NYSDOT ROW:
    - Unless otherwise agreed to by landowner, underground equipment from onshore transmission line facilities will be removed to a depth of 4 ft (1.2 m) below grade. All non-hazardous structures (i.e., below-grade piping, conduit/ductbank, vaults, or other Project facilities), and foundations greater than 4 ft (1.2 m) below grade, will remain in place. Cable vaults will be filled with sand and manhole covers welded in place.
- Onshore, Underground Transmission Line Equipment Located Within a NYSDOT ROW:
    - For decommission planning, it is assumed that all non-hazardous structures (i.e., below-grade piping, conduit/ductbank, vaults, or other Project facilities), and foundations from the onshore transmission line facilities, regardless of burial depth, will be removed, including the structures comprising the Carmans River HDD. Unless otherwise described herein, the only exception to the removal of this equipment is, if, at the time of decommissioning, NYSDOT determines that it is in the best interests of New York State to allow any such equipment to remain. For estimate purposes, it is assumed that cable vaults and manhole covers are to be removed in accordance with the foregoing terms.
- OnCS-DC Equipment:
    - The OnCS-DC will have all above-grade equipment (e.g., transformers, circuit

breakers, switches, etc.) removed and disposed of properly or recycled where feasible. All below-grade equipment (e.g.. foundations, drainage, conduit, etc.) will be removed to a depth of 4 ft below grade. Transformers will be disassembled to be scrapped and removed from site. The cost to drain and dispose of transformer oil off-site will be included in the decommissioning cost estimate.

- The removal of the ICW HDD and trenchless railroad and roadway crossings are not included in the decommissioning cost estimate.
- Crushed rock from access roads and OnCS-DC areas will be removed unless it is agreed with the landowner that it should be left in place.
- Interconnection facilities at Holbrook Substation will be removed unless otherwise agreed to by LIPA.
- Disturbed areas onshore will be restored to grade, reclaimed with native soils, seeded, and replanted with native vegetation consistent with the surrounding land use.
- Full removal of the SRWEC-NYS, excluding the Landfall HDD but including removal of cable protection, unless otherwise agreed to by the appropriate regulatory agency(ies).

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APPENDIX S

NYSDEC SUPPLEMENTAL SPECIFICATIONS FOR WETLANDS AND WATERBODIES

CASE 20-T-0617

APPENDIX S

NYSDEC SUPPLEMENTAL SPECIFICATIONS FOR WETLANDS AND WATERBODIES

The Specifications set forth below are in addition to, or refinements of, the elements required in the Specifications for the Development of Environmental Management and Construction Plan ("EM&CP Specifications") contained in Appendix E of the Joint Proposal. The applicant must incorporate in the EM&CP all the information specifically described in this Appendix.

Wetland and Waterbody Construction Specifications

1) Show the extent of clearing and ground disturbance in each wetland, state-regulated wetland adjacent area, and waterbody on the construction drawings.

2) Waterbodies and wetlands summary tables under sections 5 and 6 of the EM&CP Specifications must include the following information for each waterbody and wetland located within the Project ROW and along access roads: proposed structure/disturbance type; NYSDEC ID; NYSDEC classification code (e.g. , C(T) stream standards, and Class I, II, III, and IV state-regulated wetlands); wetland cover type; wetland functions and values; total area of temporary disturbance (sq. ft.); total area of permanent impact (sq. ft.); conversion of forested and scrub-shrub wetlands (sq. ft.); and stream flow designation (perennial, intermittent, or ephemeral).

3) Provide a narrative description of construction activities within regulated wetlands, state regulated 100-foot wetland adjacent areas, and waterbodies that shows compliance with the following requirements:

    a. Where new permanent access roads are to be constructed through wetlands, a layer of geotextile fabric or equivalent underlayment must be used;

    b. In the event that construction results in an alteration to wetland hydrology, the breach must be immediately sealed, and no further activity may take place until DPS and NYSDEC staff are notified and a remediation plan to restore the wetland and prevent future dewatering of the wetland has been accepted by DPS and NYSDEC;

c. Measures to minimize soil compaction in wetlands and waterbodies, including the use of temporary matting, low weight to surface area equipment or constructing when soils are frozen;

d. Measures and details demonstrating how work areas will be isolated from flowing streams and standing water in wetlands, including the use of water handling methods such as sandbags, cofferdam, piping or pumping. The details shall include a discussion of:
   i. the management of waters accumulated in the isolated work area to ensure settling and filtering of solids and sediments before water is returned to a wetland or waterbody;
   ii. restoration measures for the isolated work area in streams including the complete removal of the temporary measures, reestablishment of pre-construction contours, and stabilization and seeding immediately following the completion of work;
   iii. the manner by which low flow conditions will be maintained and water depths and velocities similar to undisturbed upstream and downstream reaches will be preserved so that the movement of native aquatic organisms is sustained;

e. Measures to minimize impacts to fish and wildlife during wetland and waterbody construction, including actions to prevent entrapment of fish and wildlife in the work area and, if entrapment occurs, actions to timely and safely move the animals to appropriate undisturbed locations outside the work area; and

f. Procedures to remove all excess fill materials to upland areas at least 50 feet from waterbodies and outside of the state-regulated 100-foot adjacent area.

Waterbody and Wetland Restoration Specifications

Include the following measures and details:

1) Restoration of pre-construction site conditions and stabilization of disturbed wetlands and waterbodies as site conditions and facility design allow within 48 hours or as soon as practicable after completion of construction;

2) Restoration of disturbed streams as follows:

a. Stabilization of stream banks above ordinary high-water elevation with natural fiber matting, seeded with an appropriate perennial native riparian seed mix, and mulched with straw within two (2) days of final grading;
b. Streams must be equal in width, depth, gradient, length, and character as the pre-existing conditions and tie in smoothly to the profile of the stream channel upstream and downstream of the project area. The planform of any stream must not be changed; and
c. Woody stream bank vegetation must be replaced with ROW compatible native plantings as site conditions and facility design allow;

3) Revegetation of disturbed state-regulated wetlands and 100-foot adjacent areas with native plants. Appropriate native wetland species mixes must be described (e.g., Ernst Wetland Mix (OBL-FACW Perennial Wetland Mix, OBL Wetland Mix, Specialized Wetland Mix for Shaded OBL-FACW; ROW compatible native plantings; and/or crop seed mixes consistent with existing, continued agricultural use);

4) Monitoring of restoration areas until an 80% cover of native plant species with the appropriate wetland indicator status has been reestablished over all portions of the restored area;

5) If, after two years, monitoring demonstrates that the criteria for restoration (80% native species cover) is not met, the Certificate Holder must submit a Wetland Planting Remedial Plan (WPRP). The WPRP must include an evaluation of the likely reasons for the results, including an analysis of poor survival; a description of corrective actions to ensure a successful restoration; and a schedule for conducting the remedial work. Once accepted by DPS and NYSDEC, the WPRP must be implemented according to an approved schedule.

Wetland Mitigation Plan for State-Regulated Wetlands

The Wetland Mitigation Plan, intended to compensate for unavoidable loss of wetland functions and values, must include the following:

1) The creation of compensatory wetlands at appropriate ratios;

2) A construction timeline for the mitigation activities;

3) Construction details for meeting all requirements contained in the proposed certificate conditions;

4) Agreed-upon performance standards for determining wetland mitigation success;

5) Provisions for post-construction annual monitoring and reporting for a period of five years after completion of the wetland mitigation;

6) After each agreed-upon monitoring period, the Certificate Holder must take corrective action for any areas that do not meet the above-referenced performance standards to increase the likelihood of meeting the performance standards after five years; and

7) If, after five years, monitoring demonstrates that the wetland mitigation is still not meeting the established performance standards, the Certificate Holder must submit a Wetland Mitigation Remedial Plan (WMRP). The remedial plan must include an evaluation of the likely reasons for not achieving performance standards, a description of corrective actions to ensure a successful mitigation, and a schedule for conducting the remedial work. Once accepted by DPS and NYSDEC, the WMRP must be implemented according to an approved schedule.

Stream Crossings Specifications

1) For each new permanent crossing of a "protected stream" (C(T) or higher) and/or "navigable waters of the state" as those terms are defined at 6 NYCRR Part 608, the following must be provided:

    a. Detailed plan, profile, and cross-sectional view plans;

    b. Drainage area and flow calculations to ensure that the design will safely pass the 1% annual (100-year return) chance storm event; and

    c. Location, quantity, and type of fill.

2) Bridges shall be utilized for each new permanent stream crossing and shall span the stream bed and banks. If a bridge is not practicable, an alternatives analysis must be provided, including written justification in the EM&CP for why a bridge is not practicable. If a bridge is deemed not practicable then the following options, in order, shall be considered and evaluated: an open bottom arch culvert; three-sided box culvert and round/elliptical culvert. NOTE: For stream channels with slopes greater than 3% an open bottom culvert must be used. All culverts shall be designed to:

    a. Contain native streambed substrate or equivalent;

b. Be a minimum width of 1.25 times the width of the stream bed. The stream bed is measured bank to bank at the ordinary high-water level or edges of terrestrial, rooted vegetation;

c. Include a slope that remains consistent with the slope of the upstream and downstream channel; and

d. Facilitate downstream and upstream passage of aquatic organisms.

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