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 Deficiency No. 9

SUNRISE WIND LLC's
RESPONSE TO DEFICIENCY NOTICE

Deficiency No. 9

16 NYCRR §86.5(b)(1) requires the Applicant to describe "[c]hanges (if any) to physical or biological processes of plant life/wildlife through any change in hydrology, topography or soils." Section 4.1.1 of the application states that the target burial depth for the SRWEC–NYS will be determined based on an assessment of seafloor conditions and Section 4.8.2 states that the typically targeted burial depth will be from 3 to 7 feet. Exhibit 4 should include a discussion on the proposed changes in the physical and biological processes of aquatic wildlife as a result of burying the cable 3 to 7 feet.

Exhibit 4 also states that various installation methods for the SRWEC–NYS were considered, including hydraulic plow (i.e., jet-plow and controlled flow excavation), mechanical plow, and mechanical dredging (i.e., mechanical cutter and trailing suction hopper dredger). However, Exhibit 4 does not provide an evaluation of the changes to the physical or biological processes of plant life/wildlife for each of these proposed methods. Please provide a narrative discussion and tabular summary which compares the various installation methods and such an evaluation.

<u>Sunrise Wind's Response:</u>

As described in Exhibit 4 and Exhibit E-3 as filed with the Application, the SRWEC–NYS will typically target a burial depth of 3 to 7 feet [ft] (1 to 2 meters [m]). The target burial depth will be determined based on an assessment of seabed conditions, seabed mobility, the risk of interaction with external hazards such as fishing gear and vessel anchors, and a site-specific Cable Burial Risk Assessment. The construction methodologies used to install the SRWEC–NYS will be dependent on the sediment conditions and Cable Burial Risk Assessment but may include jet plow, mechanical cutter, controlled flow excavator, pre-cut mechanical plowing, and/or pre-cut dredging (suction hopper dredge).

As to "the proposed changes in the physical and biological processes of aquatic wildlife as a result of burying the cable 3 to 7 feet," the effects on aquatic plant or wildlife are expected to be similar, regardless of the specific depth between 3 to 7 ft (1 to 2 m). For example, whether the cable is buried 3 or 7 ft (1 to 2 m), the sessile and slow-moving benthic organisms within the vicinity of the cable installation activity are expected to experience mortality because benthic organisms live only within the top 8 to 10 inches (in) (20 to 25 centimeters [cm]) of the sediment column (See Revised Exhibit 4 for information on expected impacts). Deeper burial depth may, however, result in larger volumes of sediment resuspension and subsequent deposition. That is because deeper burial depths would require the physical disturbance of more sediment volume below the surface. Larger volumes and higher rates of sediment resuspension and deposition result in a greater spatial area of the seabed that is impacted and/or larger depths of sediment deposits on the seabed surface away from the construction activity. High concentrations of suspended sediments in the water column can affect filter feeding benthic organisms such as bivalves and polychaetes, leading to changes in behavior (*e.g.*, reducing filtration rates), injury, or mortality (Wilber and Clarke 2001). Sediment deposition can result in the smothering of benthic organisms leading to injury or mortality, particularly sessile invertebrates.

Although the final burial depth between 3 and 7 ft (1 to 2 m) is not expected to have differing impacts on aquatic plants or wildlife, the potential methodologies used to construct the

SRWEC–NYS will have varying degrees of effects on benthic organisms, demersal fish, and sea turtles. Table 1 provides detailed information in tabular and narrative format on the various impacts the potential construction methodologies could have on benthic organisms, as well as other aquatic wildlife and plants. Additional information regarding those varying construction effects given variations in potential sediment disturbance and deposition is available from studies conducted during installation of the cable for the Block Island Wind Farm (BIWF) as well as other available studies, which are summarized below.

It is anticipated that the two primary construction methods will be the jet plow and mechanical cutter. Given the sandy nature of the SRWEC–NYS corridor, jet plow is anticipated to be used for the majority of the cable route. Controlled flow excavation (CFE) and/or the suction hopper dredge may be required for sand wave leveling or when burial depth is not achievable by the primary methods due to the sediment characteristics.

The sediment disturbance resulting from the use of a jet plow was studied during monitoring studies at BIWF that included visual monitoring, acoustic backscatter, and optical backscatter to evaluate total suspended sediments (TSS) and video footage to document sedimentation spillover (Elliot et al. 2017). The sediment characteristics are generally similar between this BIWF area and along the SRWEC–NYS, so this study provides useful empirical data that is likely applicable to SRWEC–NYS. The BIWF cable installation used a customized jet plow with burial depths targeting 6 ft (1.8 m). A sediment plume was not visible from the surface, and TSS concentrations were negligible (<1 milligrams/liter [mg/l] at the surface and <6 mg/l at the seabed). Suspended sediment levels were up to 100 times lower than model results. Biological responses of marine fish and invertebrates to TSS are generally not studied at concentrations less than 10 mg/l (Wilber and Clarke 2001).

Sediment deposition was directly measured during the BIWF cable installation and provides reasonable estimates for deposition anticipated during the SRWEC–NYS installation. The overspill of sedimentation from jet-plow trenching at BIWF extended 5 to 23 ft (1.5 to 7 m) and was up to ~10 in (25 cm) thick. On average, overspill extended 12.5 ft (3.8 m) at a depth of 2.7 in (7 cm). Similar sedimentation patterns may be expected from SRWEC–NYS installation given the similarity in sediment type and targeted burial depth (See Revised Exhibit 4 and Appendix 4-H for information on expected impacts). Effects of this level of sedimentation on benthic organisms include mortality to demersal eggs (Suedel et al. 2017) and shelter loss for some crustacea such as the American lobster, *Homarus americanus* (Wahle and Steneck 1991). Sedimentation of relatively thin layers of sediments (<4 in [<10 cm]) allows small, shallow-burrowing infauna with characteristically high reproductive rates and wide dispersal capabilities to recover quickly. Sedimentation greater than 8 to 11.8 in (20 to 30 cm) generally eliminate all but the largest and most vigorous burrowers (Maurer et al. 1981, 1982).

The benthic habitat along the SRWEC–NYS cable corridor is characterized by sandy sediments with extensive sand ripples and sand waves, the result of natural hydrodynamic forcing caused by currents and storms. The benthic community along the SRWEC–NYS is particularly adapted to a high-energy environment with frequent resuspension and deposition events caused by natural phenomena (*e.g.*, currents, storms). While the degree of resuspension and deposition from a storm may not mirror the measured or modeled effects of cable installation, the storms would be expected to affect a much larger area and, in general, organisms in the area are adapted to some degree of physical disturbance of the sediment surface compared, for example, to estuarine habitats. As such, the benthic community is expected to recover relatively quickly from this physical disturbance of cable burial regardless of burial depth (Germano et al. 2011). Repeated seabed surveys show restoration is fastest where cables are buried by plowing in zones of high sediment supply and energetic waves/currents such as on the inner to middle continental shelf (~0 to 262 ft [~0 to 80 m] depth) where physical recovery can range from a few days to over a year (Kraus and Carter 2018). Generally, biological recovery is related to physical recovery with quicker recovery associated with areas of higher sediment supply and wave/current action (Kraus and Carter 2018). Benthic habitat recovery and the recolonization by benthic infaunal and epifaunal species may take up to one to three years (*e.g.*, AKRF Inc. et al. 2012, Germano et al. 1994, Guarinello and Carey 2020, Hirsch et al. 1978, Kenny and Rees 1994).

Installation Method	Potential Usage	Physical Disturbance Compared between Installation Methods	Potential Changes to the Physical or Biological Processes of Plant Life/Wildlife Compared Between Installation Methods				
			Eggs/Larvae	**Benthic Invertebrates**	**Demersal Invertebrates and Fish**	**Submerged Aquatic Vegetation (SAV)**	**Sea Turtles**
Jet Plow	One of two primary installation methodologies	In sandy substrates, TSS concentrations are expected to be low (Elliott et al. 2017). Sedimentation surrounding the trench may extend out 23 ft (7 m) at a maximum depth of 9.8 in (25 cm), with averages of 12.5 ft (3.8 m) distance and 2.8 in (7 cm) depth.	Local impact caused by entrainment of eggs and larvae during hydraulic dredging, which will lead to mortality. A previous assessment conducted for the South Fork Wind Farm found that the total estimated losses of zooplankton and ichthyoplankton from jet trencher entrainment were less than 0.001% of the total zooplankton and ichthyoplankton abundance present in the study area, which encompassed a linearly buffered region of 9.3 mi (15 km) around the South Fork Export Cable (INSPIRE Environmental 2018). Sediment deposition can injure or kill demersal eggs, particularly winter flounder eggs that are sensitive to even small amounts of burial. Winter flounder egg survival was significantly reduced when buried under 3 mm of sediment (Suedel et al. 2017).	Sediment resuspension may lead to increased turbidity, resulting in biological impacts on suspension-feeders that may result in injury or mortality. Given the generally sandy-nature of the substrata, suspended sediments are likely to settle out quickly and in close vicinity to the activity. Deposition of thin layers of sediments (<3.9 in [<10 cm]) allows small, shallow-burrowing infauna with characteristically high reproductive rates and wide dispersal capabilities to recover quickly. Sedimentation greater than 7.8 to 11.8 in (20 to 30 cm) generally eliminates all but the largest and most vigorous burrowers (Maurer et al. 1981, 1982).	Effects include the loss of shelter for juvenile crustacea, *e.g.*, American lobster (Wahle and Steneck 1991) if cobble or rocky substrate is covered by sediments. Demersal invertebrates and fish that feed on benthic invertebrates may have a temporary reduction in prey availability within the footprint of the cable route and sedimentation area. For a short term, some species may be attracted initially to the disturbance and prey on dislodged benthic species or species injured or flushed during hydraulic dredging.	No SAV is known in the area.	

Installation Method	Potential Usage	Physical Disturbance Compared between Installation Methods	Potential Changes to the Physical or Biological Processes of Plant Life/Wildlife Compared Between Installation Methods				
			Eggs/Larvae	**Benthic Invertebrates**	**Demersal Invertebrates and Fish**	**Submerged Aquatic Vegetation (SAV)**	**Sea Turtles**
Controlled Flow Excavator (CFE)	May be required for sand wave leveling, or in scenarios where target burial depth is not achievable with primary methodologies (*e.g.*, mechanical problems with trencher, adverse weather, unforeseen soil conditions).	Physical sediment disturbances are expected to be similar to the jet plow.	Biological responses are expected to be similar to those described for the jet plow.	Biological responses are expected to be similar to those described for the jet plow.	Biological responses are expected to be similar to those described for the jet plow.	No SAV is known in the area.	
Suction Hopper Dredger	May be required for sand wave leveling, or in scenarios where target burial depth is not achievable with primary methodologies (*e.g.*, mechanical problems with trencher, adverse weather, unforeseen soil conditions).	Physical sediment disturbances are expected to be higher than hydraulic plow (jet plow/CFE). Increased turbidity can occur at the surface and throughout the upper water column if overflow from the hopper occurs (Decrop et al. 2018). Entrainment of organisms in the suction hopper draghead is key concern.	Local impacts caused by entrainment of eggs and demersal larvae during hydraulic dredging, which will lead to mortality. Sediment deposition can injure or kill eggs, particularly winter flounder eggs that are sensitive to even small amounts of burial (Suedel et al. 2017).	Direct mortality will occur for benthic invertebrates that are excavated by the draghead. Biological responses of sediment resuspension and deposition are expected to be similar to the other hydraulic methodologies.	Sediment plumes may occur throughout the water column if overflow from the hopper occurs. This may cause injury to motile fish and invertebrates if TSS concentrations are high.	No SAV is known in the area.	May become entrained in the suction hopper draghead, where they are taken directly by the force of the suction or entrapped beneath the draghead as it travels over the sediment. These impacts, especially for entrainment, most often result in severe injury and/or mortality (Murray 2011, Ramirez et al. 2017).

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			Eggs/Larvae	**Benthic Invertebrates**	**Demersal Invertebrates and Fish**	**Submerged Aquatic Vegetation (SAV)**	**Sea Turtles**
Pre-cut Plowing	May be required during surface boulder clearance, or in scenarios where target burial depth is not achievable with primary methodologies (*e.g.*, mechanical problems with trencher, adverse weather, unforeseen soil conditions). This method is typically suited for harder soil types.	Less physical sediment disturbance than hydraulic plow (jet plow / CFE).	Habitat disturbance would be limited to the trench being cut, resulting in the loss of the benthic eggs over this footprint. Boulder relocation may crush benthic eggs leading to injury and mortality.	Habitat disturbance would be limited to the trench being cut, resulting in the loss of the benthic infauna over this footprint. Recovery rate is expected to be faster than for hydraulic trenching (Njock et al. 2020). Boulder relocation may crush sessile epifaunal and infaunal species leading to injury and mortality.	Little risk to motile invertebrates and fish. Habitat change as a result of boulder relocation and reconfiguration may indirectly impact these species.	No SAV is known in the area.	
Mechanical Cutter	One of two primary installation methodologies.	Less physical sediment disturbance than hydraulic plow (jet plow / CFE).	Biological responses are expected to be similar to those described for the pre-cut plowing.	Biological responses are expected to be similar to those described for the pre-cut plowing.	Biological responses are expected to be similar to those described for the pre-cut plowing.	No SAV is known in the area.	

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