SUNRISE WIND LLC

SUNRISE WIND NEW YORK CABLE PROJECT

REVISED EXHIBIT E-1

DESCRIPTION OF PROPOSED LINE

PREPARED PURSUANT TO 16 NYCRR § 88.1

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Acronyms and Abbreviations

AC	alternating current
Applicant	Sunrise Wind LLC
CFR	Code Federal Regulations
cm	centimeter(s)
DC	direct current
ft	feet
in	inch(es)
km	kilometer(s)
kV	kilovolt(s)
LIE	Long Island Expressway
LIPA	Long Island Power Authority
m	meter(s)
MHWL	Mean High Water Line
mi	mile(s)
mm	millimeter(s)
nm	nautical miles
NPS	National Park Service
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OCS	Outer Continental Shelf
OnCS–DC	Onshore Converter Station–Direct Current
OREC	Offshore Wind Renewable Energy Certificate
Project	Sunrise Wind New York Cable Project
PSL	New York Public Service Law
ROW	right-of-way
SRWEC	Sunrise Wind Export Cable

SRWEC–NYS	Sunrise Wind Export Cable–New York State
SRWF	Sunrise Wind Farm
TJB	transition joint bay
US	United States
USACE	United States Army Corps of Engineers

EXHIBIT E-1: DESCRIPTION OF PROPOSED TRANSMISSION LINE

In accordance with New York Public Service Law (PSL) § 122 and 16 New York Codes, Rules and Regulations (NYCRR) § 88.1, this exhibit provides a description of the proposed transmission line, including, as applicable: (a) the design voltage and voltage of initial operation; (b) the type, size, number, and materials of conductors; (c) insulator design; (d) the length of the transmission line; (e) the construction materials of the towers; and (f) the design standards for each type of tower and tower foundation.

E-1.1 INTRODUCTION

Sunrise Wind LLC (Sunrise Wind or the Applicant), 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). The Project includes offshore and onshore components within NYS that are subject to PSL Article VII review and will interconnect at the existing Holbrook Substation, which is owned and operated by the Long Island Power Authority (LIPA).

Specifically, power from the SRWF will be delivered to the existing mainland electric grid via distinct Project segments: the submarine segment of the export cable (SRWEC), which will be located in both federal and NYS waters (the NYS portion of the cable referred to as the SRWEC–NYS); the terrestrial underground segment of the transmission cable (Onshore Transmission Cable); the new Onshore Converter Station (OnCS–DC); and the underground segment of the interconnection cable (Onshore Interconnection Cable). The Onshore Transmission Cable, the OnCS–DC, and Onshore Interconnection Cable (collectively, the Onshore Facilities) are all located in the Town of Brookhaven, Suffolk County, New York.

The Project's components are generally defined into two categories:

- SRWEC–NYS
    - One direct current (DC) submarine export cable bundle (320 kilovolt [kV]) up to 6.2 miles (mi) (10 kilometers [km]) in length in NYS waters and up to 1,575 feet (ft) (480 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 bays (TJBs).

- Onshore Facilities
    - One DC underground transmission circuit (320 kV) (referred to as the Onshore Transmission Cable) up to 17.5 mi (28.2 km) in length within existing roadway right-of-way (ROW), TJBs, and concrete and/or direct buried joint bays and associated components;
    - One OnCS–DC that will transform the Project voltage to 138 kV alternating current (AC);
    - Two AC underground circuits (138 kV) (referred to as the Onshore Interconnection Cable) up to 1 mi (1.6 km) in length, which will connect the new OnCS–DC to the existing Holbrook Substation; and
    - Fiber optic cables co-located with both the Onshore Transmission Cable and Onshore Interconnection Cable.

E-1.2 DESCRIPTION OF PROPOSED TRANSMISSION LINE

Power from the SRWF will be delivered to the electric grid via distinct transmission cable segments: the SRWEC and Onshore Transmission Cable will carry the power from the SRWF to the OnCS–DC, and the Onshore Interconnection Cable will deliver the power from the OnCS–DC to the existing grid. The SRWEC–NYS will be spliced together with the Onshore Transmission Cable at co-located TJBs and Link Boxes located at Smith Point County Park on Fire Island in the Town of Brookhaven.

The SRWEC–NYS and Onshore Transmission Cable have different design requirements; therefore, these transmission components are described separately. The SRWEC–NYS is described in Section E-1.2.1, and the Onshore Transmission Cable and Onshore Interconnection Cable (collectively, the Onshore Transmission Facilities) are described in Section E-1.2.2. Further design details and descriptions of the installation techniques for the transmission lines are included within Revised Exhibit 5: Design Drawings and Revised Exhibit E-3: Underground Construction, respectively. The design details and construction of the OnCS–DC is described in Revised Exhibit E-2: Other Facilities.

E-1.2.1 SRWEC–NYS

The SRWEC, which includes the SRWEC–NYS, will deliver the electricity from the SRWF and will be jointed with the Onshore Transmission Cable at the TJBs located at the landfall location at Smith Point County Park in the Town of Brookhaven. The SRWEC–NYS will begin in NYS waters at a point 3 nautical miles (nm) offshore of Long Island. In addition, a segment of the SRWEC–NYS (up to 1,575 ft [480 m]) will be located onshore (*i.e.*, above MHWL) and underground, up to the TJBs, as described in Revised Exhibit 2: Location of Facilities.

The SRWEC–NYS will consist of one cable bundle comprised of two cables traversing through NYS waters. Each cable within the single bundle will consist of one copper or aluminum conductor core

surrounded by layers of cross-linked polyethylene insulation, a metallic water blocking layer, an outer polyethylene sheath encased in one or two layers of steel or polyethylene armouring wires to protect the cable from external damage and keep it watertight. The outer serving is corrosion protection of the armour wires and consists of outer yarns embedded in a bitumen compound. The final outer layer of yarns can be color coded for cable identification.

A fiber optic cable will be bundled together with the two main cables. Continuous monitoring of the SRWEC–NYS will be provided by the fiber optic cable, which will assist in cable fault detection, control and monitoring, and communication.

The SRWEC–NYS will not contain lubricants, liquids, or oils. A cross-section of a typical DC subsea cable is shown in Figure 1.2-1 and provided in Revised Exhibit 5: Design Drawings.

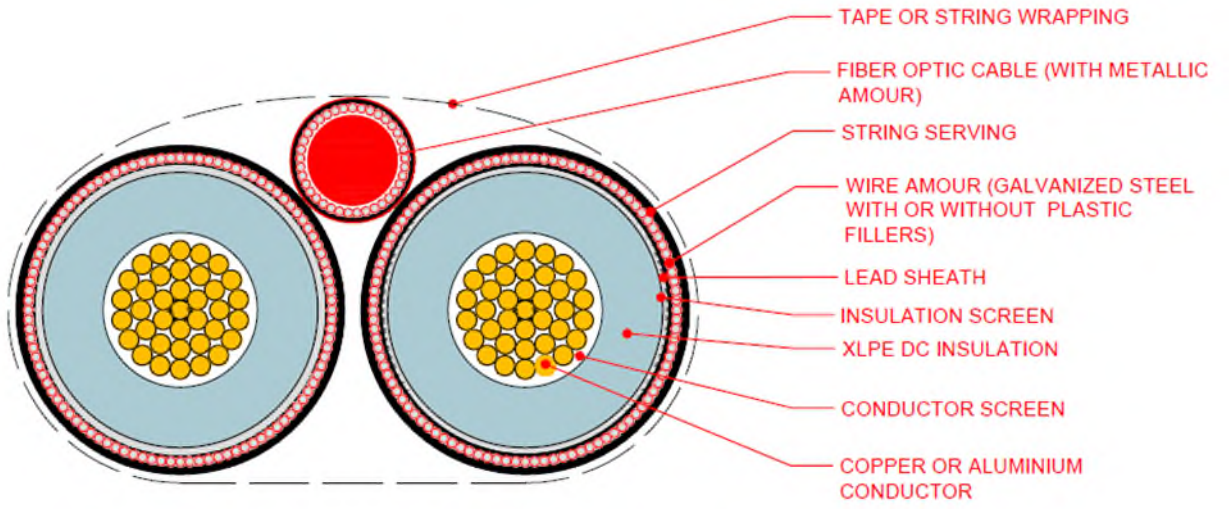

Figure E-1.2-1 Typical DC Subsea Cable Cross Section

The maximum design scenario for the SRWEC–NYS is provided in Revised Table E-1.2-1.

Revised Table E-1.2-1. SRWEC–NYS Maximum Design Scenario

SRWEC–NYS Feature	Maximum Design Scenario
Number of Cables	2 cables bundled together with a fiber optic cable
Design Voltage per Circuit	320 kV DC
Voltage of Initial Operation	320 kV DC
Individual Cable Diameter	7.8 inches (in) (200 millimeter [mm])
Target Burial Depth a/	3 to 7 ft (1 to 2 m)
Max Water Depth in New York	105 ft (32 m)

SRWEC–NYS Feature	Maximum Design Scenario
NOTES: a/ Burial of the SRWEC–NYS will typically target a depth of 3 to 7 ft (1 to 2 m). The target burial depth for the SRWEC–NYS 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.	

There will be up to two TJBs (*i.e.*, one for each cable comprising the SRWEC–NYS). In each TJB, each SRWEC–NYS cable will be spliced to one single-phase conductor onshore cable, as described in more detail in Revised Exhibit E-3: Underground Construction.

TJB and Link Box Design

TJBs are comprised of pits that are dug in the soil and lined with concrete. The purpose of a TJB is to provide a clean, dry environment for the jointing of the SRWEC–NYS and the Onshore Transmission Cable as well as protecting the joint once the jointing is completed and allowing for inspections if necessary. There will be up to two TJBs (*i.e.*, one for each cable comprising the SRWEC–NYS). In each TJB, each SRWEC–NYS cable will be spliced into one single conductor onshore cable. The sheaths from the SRWEC–NYS and the Onshore Transmission Cable will be terminated into a link box via cable joints. The fiber optic cable from the SRWEC–NYS and Onshore Transmission Cable will be joined inside a fiber optic joint box. There will be up to two link boxes and two fiber optic cable joint boxes.

A conceptual schematic of the TJBs is provided in Revised Exhibit 5: Design Drawings. Each of the co-located TJBs will be up to 82 ft x 16 ft x 16 ft (25 m x 5 m x 5 m). Should a fiber optic cable joint box and link box be required, an additional concrete pit approximately 6.6 ft x 6.6 ft x 6.6 ft (2 m x 2 m x 2 m) would be needed for each. The TJBs, 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). A conceptual schematic of the Landfall Work Area is provided in in Revised Exhibit 5: Design Drawings. The Project-specific TJB is in the preliminary design stages and will be finalized with detailed design in the Project Environmental Management and Construction Plan (EM&CP). Access to the fiber optic handhole and link box handhole near the TJBs during the operational phase will be via manhole covers. Access to the splices in a TJB will require excavation from grade to expose the splices.

A precast splice vault may also be used as an alternative to TJBs. The precast splice vault would consist of dimensions similar to the TJB; however, the splices would be housed in a precast enclosure on all sides, with manhole risers and covers for access from grade. Access to the link box would be provided via the splice vault and access to the fiber optic cable joint box would be via manhole cover to a separate chamber outside of the splice vault. Access to the splices in a splice vault would be via manhole cover. The amount of ground disturbance would be similar between the two options.

E-1.2.2 Onshore Transmission Facilities

The Onshore Transmission Cable will be located within the Town of Brookhaven and will be up to 17.5 mi (28.2 km) long with a voltage capacity of up to 320 kV DC. The SRWEC-NYS will be spliced together with the Onshore Transmission Cable within TJBs and link boxes located within the Landfall Work Area on the eastern portion of Smith Point County Park, as described in Revised Exhibit 2: Location of Facilities. At the TJB, the two monopole SRWEC–NYS cables will be spliced into two cables that comprise the Onshore Transmission Cable (each comprising a single phase cable) and two fiber optic cables. Each cable will consist of one copper or aluminum conductor core surrounded by layers of cross-linked polyethylene insulation, a metallic shield consisting of plain annealed copper wires, a water blocking layer over the metallic shield consisting of semi-conducting swellable tapes and laminated copper foil, with the outermost layer consisting of a polyethylene jacket. A cross section of a typical onshore transmission cable is shown in Figure E-1.2-2 and provided in Revised Exhibit 5: Design Drawings.

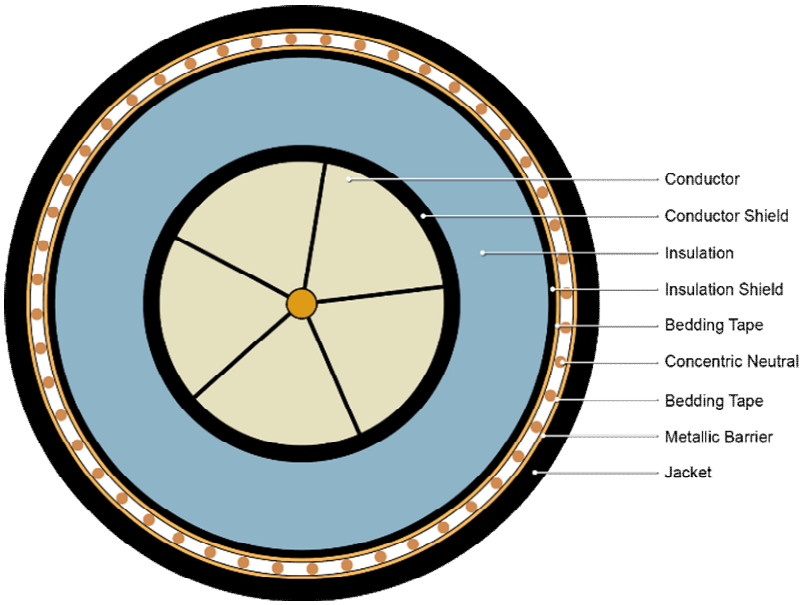

Figure E-1.2-2 Typical Onshore DC Single Phase Cable Cross Section

As described in Revised Exhibit 2: Location of Facilities, the Onshore Transmission Cable will follow predominantly existing road ROW to the OnCS–DC at the Union Avenue Site. Routing of the Onshore Transmission Cable prioritized locations within existing disturbed ROW to the extent practicable.

The Onshore Interconnection Cable from the OnCS–DC will begin at a set of termination structures located along the northerly portion of the site and will be routed entirely underground along Union Avenue to existing utility-owned or controlled property for connection to the Holbrook Substation. The termination structures will be made of galvanized steel on concrete foundations. The Onshore Interconnection Cable

will consist of two circuits comprised of six cables per circuit. Each cable within the single bundle will consist of one copper or aluminum conductor core surrounded by layers of cross-linked polyethylene insulation, a metallic shield consisting of plain annealed copper wires, a water blocking layer over the metallic shield consisting of semi-conducting swellable tapes and laminated copper foil, with the outermost layer consisting of a polyethylene jacket. A fiber optic cable will be bundled together with the two main cables. A cross section of a typical onshore AC interconnection cable is provided in Figure E-1.2-3.

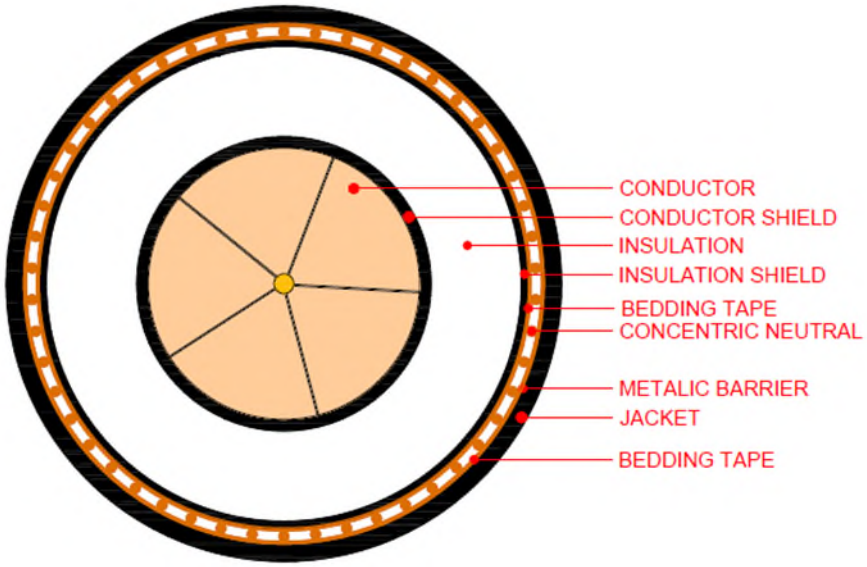

Figure E-1.2-3 Typical Onshore AC Single Phase Cable Cross Section

The Onshore Transmission Cable and Onshore Interconnection Cable will not contain lubricants, liquids, or oils.

The maximum design scenario for the Onshore Transmission Cable and Onshore Interconnection Cable is provided in Revised Table E-1.2-2.

Revised Table E-1.2-2. Onshore Transmission/Interconnection Cable Maximum Design Scenario

Onshore Transmission/ Interconnection Cable Feature	Maximum Design Scenario
Number of Onshore Transmission Cables	2
Number of Interconnection Cables	12
Number of Fiber Optic Cables	2
Design Voltage Onshore Transmission Cable	320 kV DC
Voltage Onshore Transmission Cable at Initial Operation	320 kV DC
Design Voltage Onshore Interconnection Cable	138 kV AC
Voltage Onshore Interconnection Cable at Initial Operation	138 kV AC
Diameter Onshore Transmission Cable	6 in (152 mm)

Onshore Transmission/ Interconnection Cable Feature	Maximum Design Scenario
Diameter Onshore Interconnection Cable	6 in (152 mm)
Diameter Fiber Optic Cable	1 in (2.5 centimeter [cm])

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