SUNRISE WIND LLC

SUNRISE WIND NEW YORK CABLE PROJECT

REVISED EXHIBIT E-2

OTHER FACILITIES

PREPARED PURSUANT TO 16 NYCRR § 88.2

This page intentionally left blank.

Table of Contents

EXHIBIT E-2: OTHER FACILITIES E-2-1

E-2.1 INTRODUCTION E-2-1

E-2.2 NECESSITY FOR THE ONCS–DC E-2-2

E-2.3 DESCRIPTION OF THE ONCS–DC E-2-2

E-2.3.1 Design E-2-2

E-2.3.2 Construction E-2-4

E-2.3.3 Control and Protection E-2-6

E-2.3.4 Terminal Facility Upgrades E-2-6

LIST OF TABLES

Table E-2.3-1. OnCS–DC Equipment E-2-4

Table E-2.3-2. Summary of Maximum Potential Volumes of Oils, Fuels and Lubricants for the OnCS–DC E-2-4

Table E-2.3-3. Typical OnCS–DC Construction Sequence E-2-4

Revised Table E-2.3-4. Maximum Design Scenario for the OnCS–DC E-2-5

Acronyms and Abbreviations

Applicant	Sunrise Wind LLC
AC	alternating current
ASCE	American Society of Civil Engineers
BMP	best management practice
CFR	Code of Federal Regulations
DC	direct current
DFE	design flood elevation
EM&CP	Environmental Management and Construction Plan
FEMA	Federal Emergency Management Agency
ft	feet
gal	gallon(s)
ha	hectare(s)
HDD	horizontal directional drilling
IEEE	Institute of Electrical and Electronics Engineers
km	kilometer(s)
kV	kilovolt(s)
L	liter(s)
lb	pound(s)
LIE	Long Island Expressway
LIPA	Long Island Power Authority
LIRR	Long Island Rail Road
m	meter(s)
MHWL	mean high water line
mi	mile(s)
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NPCC	Northeast Power Coordinating Council, Inc.

NYCRR	New York Codes, Rules and Regulations
NYISO	New York Independent System Operator, Inc.
NYPA	New York Power Authority
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
SCADA	Supervisory Control and Data Acquisition
SF_6	sulfur hexafluoride
SPCC	Spill Prevention, Control, and Countermeasure
SPDES	State Pollutant Discharge Elimination System
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-2: OTHER FACILITIES

In accordance with New York Public Service Law (PSL) § 122 and 16 New York Codes, Rules and Regulations (NYCRR) § 88.2, this exhibit (1) explains the necessity for the station that is part of the Project, (2) provides a description of the electrical information and equipment needed to complete this other facility, and (3) details the Project's terminal facility.

E-2.1 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 of 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-2.2 NECESSITY FOR THE ONCS–DC

Power will be delivered from the SRWF to the electric grid via an OnCS–DC that will be constructed in the Town of Brookhaven, Long Island, New York. Interconnection to the electric grid will occur at LIPA's existing Holbrook Substation, which is also located in the Town of Brookhaven. Delivery of the power to the Holbrook Substation will require construction of the OnCS–DC to support the Project's interconnection to the existing electrical grid by transforming the Project voltage to 138 kV AC.

E-2.3 DESCRIPTION OF THE ONCS–DC

Several locations were evaluated for the OnCS–DC based on parcel availability, environmental resources, land use and zoning, distance to shore, design requirements, and construction feasibility. Union Avenue South was ultimately selected as the location for the OnCS–DC. For the purposes of the environmental assessment presented in this Article VII application, the site is referenced as the "Union Avenue Site."

The Union Avenue Site is located on the south side of Union Avenue in the Town of Brookhaven, this approximately 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 Long Island Rail Road (LIRR) and commercial development; and to the west by commercial and industrial development.

The Applicant is in discussion with the respective owner regarding acquisition or lease of the property for the Project.

E-2.3.1 Design

The entire OnCS–DC footprint area will be graveled and surrounded by a 7-ft (2.1-m)-high fence topped with a 1-ft (0.3-m)-tall barbed wire extension for a total height of 8 ft (2.4 m). Access will be provided through a minimum of one drive-through gate and one walk-through gate. Vegetative screening of the site will be provided as needed subject to NYS permitting requirements and detailed in the Project

Environmental Management and Construction Plan (EM&CP). General yard lighting will be provided within the site for assessment of equipment. In general, yard lighting will be minimal at night and will comply with NYS and local requirements unless there is work in progress on site or lights are required for safety and security purposes.

A conceptual layout for the OnCS–DC is depicted in Revised Exhibit 5: Design Drawings. Station equipment and structures will be supported on foundations expected to be of concrete and will be designed to be suitable for existing soil conditions. The final foundation design and equipment layout may vary based on site-specific geotechnical evaluations and subsequent engineering design.

The OnCS–DC will be designed to meet New York State Building Code/2015 International Building Code, American Society of Civil Engineers (ASCE) Standard 7-16, ASCE 113, ASCE 24-14, National Electric Safety Code (NESC), all applicable Institute of Electrical and Electronics Engineers (IEEE) standards, and local climate and geotechnical conditions. Grading at the OnCS–DC will ensure adequate drainage and ensure that the site is graded appropriately to reduce impacts from water accumulation. The design will consider the potential effects of erosion, high winds, and ice. The OnCS–DC will be located in the Town of Brookhaven, well inland of the 100-year and 500-year floodplain, and the minimum equipment elevations at the OnCS–DC site exceed both the present day and future worst-case Design Flood Elevation (DFE), as recommended in ASCE 24-14. Because the OnCS–DC will be located inland, impacts from sea level rise, storm surge, overland wave propagation, and runup and overtopping hazard are not expected to affect the OnCS–DC during the Project's lifetime.

The engineering of the OnCS–DC will be based on a 320 kV symmetric monopole design. The OnCS–DC will consist of a both a dedicated DC portion as well as an AC portion. The DC portion of the OnCS–DC will consist of a valve hall and cooling devices, which are unique to the converter design. The AC portion of the OnCS–DC will consist of gas or air insulated switchgear system bay positions using 138 kV equipment.

The OnCS–DC will be equipped with up to two cable termination bays for connection of up to two Onshore Transmission Cables and up to two Onshore Interconnection Cable bays to the existing Holbrook Substation. Major equipment associated with the OnCS–DC is summarized in Table E-2.3-1 and detailed in Revised Exhibit 5, Revised Figure 5.3-1. A new control enclosure at the OnCS–DC will be equipped with control systems, as well as systems for local and remote control of the equipment.

Table E-2.3-1. OnCS–DC Equipment

OnCS–DC Feature	Maximum Number Required
High-Voltage Shunt Reactor (fixed)	2
High-Voltage Shunt Reactor (variable)	2
High-Voltage Harmonic Filter	2
Gas-Insulated Switchgear Bay	10
Grid Transformer (single phase)	4

The OnCS–DC will require mineral oils to support operation of the facility equipment. Table E-2.3-2 provides a summary of the maximum anticipated oil volumes. The equipment listed will be mounted on concrete foundations with concrete secondary oil containment designed for containment in accordance with industry and local utility standards. A Spill Prevention, Control, and Countermeasure (SPCC) plan will be developed in support of State Pollutant Discharge Elimination System (SPDES) permitting as part of the Project EM&CP. Additionally, OnCS–DC devices containing sulfur hexafluoride (SF_6) will be equipped with integral low-pressure detectors to detect SF_6 gas leakages should they occur.

Table E-2.3-2. Summary of Maximum Potential Volumes of Oils, Fuels and Lubricants for the OnCS–DC

OnCS–DC Equipment/System	Oil/Fuel Type	Total Oil/Fuel Volume
(2) High-Voltage Shunt Reactor (fixed)	Mineral Oil Dielectric Fluid	26,640 gallons (gal) (100,844 liters [L])
(2) High-Voltage Shunt Reactor (variable)	Mineral Oil Dielectric Fluid	37,000 gal (140,060 L)
(4) 345/275 kV Grid Transformers	Mineral Oil Dielectric Fluid	37,693 gal (107,014 L)
Gas-Insulated Switchgear Bay	SF_6	3,500 pounds (lbs)

E-2.3.2 Construction

Construction of the OnCS–DC will involve surveys and protection of sensitive areas, clearing and grading, foundation and equipment installation, site restoration, and commissioning, as described in Table E-2.3-3 below.

Table E-2.3-3. Typical OnCS–DC Construction Sequence

Stage	Activity/Action	Construction Details
1	Surveys and Protection of Sensitive Areas	Work at the OnCS–DC site will begin with the survey, staking, and protection of any sensitive areas/services. Access to the work site will then be established, segregated from the public, and the required safety measures will be implemented.
2	Clearing and Grading	The work site will be cleared of vegetation, and temporary environmental erosion controls such as swales and erosion control socks will be installed in accordance with best management practices (BMPs). These controls will be maintained until the site is restored and stabilized. The work site will be graded; the disturbed areas outside of the final site footprint will be restored.

Stage	Activity/Action	Construction Details
3	Installation	Installation of foundations will require excavation to support construction of stormwater management components and installation of other equipment. Blasting is not expected; however, if required, the appropriate blasting plans and approvals will be obtained prior to any such activity. All the major equipment will be installed upon completion of concrete foundations and cable duct banks. The equipment will be rigged and placed on the concrete foundations. The transport and logistics company that will act as sub-contractor to the equipment manufacturer will be responsible for all logistical services, *e.g.*, engineered rigging/skidding and hauling plans, routing, permitting, clearance checking, escort, police escort, load analysis of transport, as well as dimensional restrictions. Upon installation of the equipment on the foundations, earthing, and alignment checking will be performed, and when required, anchoring and temporary protection from weather will be applied. Upon placing the equipment, a site acceptance test will be undertaken; all attachments will be completed associated with each equipment. When required, the equipment will be filled with insulating fluid and/or insulating gas.
4	Restoration	Restoration of any disturbed areas and appropriate landscaping will be performed, as necessary. Temporary environmental controls will remain (as needed) until the site is stabilized in accordance with permit requirements and detailed in the Project's EM&CP.
5	Commissioning	Upon the acceptance testing of the OnCS–DC control center, the commissioning of the OnCS–DC will commence. Prior to energization, all equipment will be tested to confirm proper operation. Energization is a sequential process that energizes the equipment and facilities in a logical order to coordinate with the equipment and system requirements to meet the Project milestones. The testing and commissioning will be performed by qualified testing personnel. The work will be performed in accordance with the applicable industry standards. The commissioning will be performed in strict adherence to the New York Independent System Operator, Inc.'s (NYISO) protocol on receiving permits and clearances.

The maximum design scenario for the OnCS–DC is provided in Revised Table E-2.3-4. Site grading may be between 7 to 10 ft (2.1 to 3.0 m) deep in areas that require excavation but will be further refined as geotechnical work is completed.

Revised Table E-2.3-4. Maximum Design Scenario for the OnCS–DC

Parameter	Maximum Design Scenario
Area Disturbed During Construction a/	7 acres (2.8 ha)
Operations Site Area b/	6 acres (2.4 ha)
Lightning Mast Height	100 ft (30.5 m)
Enclosure Height	70 ft (21.3 m)
NOTES: a/ Limit of disturbance during construction, inclusive of permanent footprint of the OnCS–DC and temporary disturbance. b/ Permanent footprint of the OnCS–DC facilities.	

Temporary Laydown Areas

The Applicant may utilize temporary laydown yards to support the staging of necessary equipment and materials for development of the OnCS–DC. Locations selected for the use of temporary laydown yards will be approved by the applicable permitting agencies prior to utilization. These areas will be generally confined to locations containing open land or previously disturbed commercial/industrial sites with existing roadway access, such that no or minimal site improvements are required. Following the completion of the Project, locations used for temporary laydown yards will be restored to pre-existing conditions in accordance with landowner requests and permit requirements and detailed in the EM&CP.

E-2.3.3 Control and Protection

The OnCS–DC will be equipped with a Supervisory Control and Data Acquisition (SCADA) system. The SCADA interface system provides monitoring, control, and protection of the high voltage and low voltage equipment and auxiliary components. This ensures safe monitoring and control of the station in operation. The protection and control equipment, such as relays and other electronics, will be housed within a control building or encased in secure weatherproof cabinets.

The Applicant will monitor the OnCS–DC remotely on a continuous basis. The equipment in the OnCS–DC will be configured with a condition monitoring system that will sound an alarm upon detecting equipment faults, unintended shutdowns, or other issues. In addition, the OnCS–DC will be inspected for anomalies with the equipment operation in accordance with manufacturers' recommendations. The Applicant will put in place an established and documented program for the maintenance of all equipment critical to reliable operation. Maintenance programs will conform to the equipment manufacturer's recommendations.

In addition, a reliability maintenance program will be implemented. Preventive maintenance will be performed on the OnCS–DC and planned outages will be conducted in accordance with the North American Electric Reliability Corporation (NERC)/Northeast Power Coordinating Council, Inc. (NPCC) Standard-TOP-003-1, and protective system maintenance will be performed in accordance with the NPCC Standard PRC-005-2. Equipment will be maintained in accordance with the interconnection agreement; maintenance will be completed by qualified personnel in accordance with applicable industry standards and good utility practice to provide maximum operating performance and reliability.

E-2.3.4 Terminal Facility Upgrades

To accept power generated by the SRWF and delivered by the Project, LIPA's existing Holbrook Substation may require certain modifications, including, but not limited to a fence line expansion. Additionally, certain other upgrades to the electrical grid beyond this substation may be needed. The scope of any potential upgrades is not known at this time as the required NYISO System Reliability Impact Studies and Facility Studies have not been finalized. The execution of any upgrades at the existing substation and of the broader electrical grid, and the specific engineering and design requirements to achieve the upgrades, will be performed by LIPA and, as such, are not addressed in this Application.

***