

Empire Offshore Wind LLC

Empire Wind 2 Project
Article VII Application

Exhibit E-2
Other Facilities

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ACRONYMS AND ABBREVIATIONS

ac	acre
EM&CP	Environmental Management & Construction Plan
Empire or the Applicant	Empire Offshore Wind LLC
EW 2	Empire Wind 2
ft	feet
GIS	gas-insulated switchgear
ha	hectare
HVAC	high-voltage alternating-current
km	kilometer
kV	kilovolt
Lease Area	Bureau of Ocean Energy Management-designated Renewable Energy Lease Area OCS-A 0512
LIPA	Long Island Power Authority
LIRR	Long Island Rail Road
m	meter
mi	mile
nm	nautical mile
NYISO	New York Independent System Operator, Inc.
NY Project	EW 2 Project transmission facilities in New York
NYSPSC or Commission	New York State Public Service Commission
POI	Point of Interconnection at an expansion of the Barrett 138-kV Substation
PSEG-LI	PSEG Long Island

EXHIBIT E-2: OTHER FACILITIES

E-2.1 Introduction

Empire Offshore Wind LLC (Empire or the Applicant) proposes to construct and operate the Empire Wind 2 (EW 2) Project as one of two separate offshore wind projects to be located within the Bureau of Ocean Energy Management (BOEM) designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The EW 2 Project will require an electric transmission system to connect the offshore wind farm to the point of interconnection (POI) to the New York State Transmission System. An electric transmission line with a design capacity of 125 kilovolts (kV) or more, extending a distance of one mile or more, is subject to review and approval by the New York State Public Service Commission (Commission or NYSPSC) as a major electric transmission facility pursuant to Article VII of the New York Public Service Law (PSL). The EW 2 Project transmission system will extend a total of approximately 12.1 miles (mi) (19.5 kilometers [km]) within the State of New York and includes 230-kV export cable circuits and 345-kV interconnection cable circuits. As such, this application is being submitted to the Commission pursuant to Article VII of the PSL for the portions of the EW 2 Project transmission system that are located within the State of New York (collectively, the NY Project).

The NY Project will interconnect to the New York State Transmission System operated by the New York Independent System Operator, Inc. (NYISO) at the Oceanside POI, located at an expansion of the Barrett 138-kV Substation. The Barrett 138-kV Substation is owned by the Long Island Power Authority (LIPA) and operated by PSEG Long Island (PSEG-LI) and is located in Oceanside in the Town of Hempstead, New York. The NY Project will enter LIPA's substation at 345 kV, where the voltage will be converted to 138 kV within the POI. The onshore portion of the NY Project will be located entirely within Nassau County, New York.

The NY Project includes:

- Three three-core 230-kV high-voltage alternating-current (HVAC) submarine export cables located within an approximately 7.7-nautical mile (nm, 14.2-km)-long submarine export cable corridor from the boundary of New York State waters 3 nm (5.6 km) offshore to the cable landfall;
- A cable landfall in the City of Long Beach, New York;
- Three 230-kV onshore export cable circuits, each with three single-core HVAC onshore export cables within an approximately 1.5-mi (2.4-km)-long onshore export cable corridor from the cable landfall to the onshore substation;
- An onshore substation in the Village of Island Park, within the Town of Hempstead, New York, which will step up the voltage to 345 kV for the onshore interconnection cables; and
- Up to three 345-kV interconnection cable circuits, each with three single-core HVAC interconnection cables within an approximately 1.7-mi (2.8-km)-long interconnection cable corridor from the onshore substation to the POI.

This Exhibit addresses the requirements of 16 New York Codes, Rules and Regulations § 88.2, including the necessity for the NY Project's proposed onshore substation and the equipment to be installed. This Exhibit also provides information on proposed terminal facilities.

E-2.2 Description of Onshore Substation

The proposed onshore substation will occupy an approximately 5.2-acre (ac) (2.1-hectare [ha]) site located at 15 Railroad Place in Island Park, New York. An additional area of approximately 0.2 ac (0.1 ha) immediately adjacent to the site will be used temporarily during construction for the Reynolds Channel crossing to bring the onshore export cables into the substation. One of the parcels that comprises the site is owned by the Applicant; the other is privately owned and is currently under commercial land use (see Section 4.10 of **Exhibit 4: Environmental Impact**). The Applicant or its affiliate will purchase or lease the property for the onshore substation and enter into temporary lease or construction easement agreements for temporary construction work areas, as needed.

The onshore substation will facilitate the connection of the power generated by the offshore wind farm into the Oceanside POI at an expansion of the Barrett 138-kV Substation, which is owned by LIPA,¹ in accordance with electric grid interconnection standards. The onshore substation functionality includes voltage regulation and the step up from 230 kV to 345 kV, reactive power compensation, and harmonic filtering, and the onshore substation will house the major control components for the electrical system. In addition, the onshore substation will have operator stations and network equipment to control and monitor systems for the offshore EW 2 Project (the primary control room will be located at the Applicant's offsite Operation and Maintenance facility in Brooklyn, New York).

A description of the transmission lines associated with the NY Project is provided in **Exhibit E-1: Description of Proposed Transmission Line**. The onshore substation site will also include telecommunication equipment for monitoring, including external communications fiber optic lines, network communications, telephone, closed-circuit television and server support systems. Final configurations and equipment specifications will be developed based on technical requirements and stakeholder engagement and will be submitted as part of the Environmental Management and Construction Plan (EM&CP). A preliminary onshore substation layout is provided in **Exhibit 5: Design Drawings**.

E-2.2.1 Onshore Substation Design

The Applicant is planning to develop an onshore substation with gas-insulated switchgear (GIS). The onshore substation will be designed to comply with applicable state and local building codes, electrical standards, and environmental conditions to the extent practicable (see **Exhibit 7: Local Ordinances** for compliance information and requested waivers). Codes, regulations, and standards to be used for design, construction, and testing are listed in **Exhibit E-3: Underground Construction**. Maintenance of the onshore substation will also be completed by qualified personnel in accordance with applicable industry standards and good utility practice to provide maximum operating performance and reliability.

The conceptual bus scheme of the facility includes a double 230-kV bus. A GIS and control building, as well as a 345-kV GIS building, will be housed at the site. Most of the remaining equipment at the onshore substation is expected to be located outdoors. The onshore substation will also contain power metering, protection relays, and communication equipment. Major equipment anticipated as part of the onshore substation will include:

- 345-kV/230-kV main autotransformers;
- 230-kV shunt reactors;

¹ The Applicant understands that LIPA will expand its existing Barrett 138-kV Substation onto a property located at the corner of Daly Boulevard and Hampton Road, in Oceanside, New York, to provide additional interconnection facilities. The Applicant's interconnection cable route ends at the fence line of LIPA's substation. The interconnection cables will enter LIPA's substation at 345 kV, where the voltage will be converted to 138 kV within the interconnection substation.

- 230-kV alternating current filters;
- 230-kV capacitor banks, as needed;
- 345-kV and 230-kV GIS buildings containing:
 - Circuit breakers,
 - Disconnectors,
 - Earth switches,
 - Voltage and current transformers, and
 - Cable terminations;
- Diesel generator;
- Medium- and low-voltage switchboards;
- Substation auxiliary transformers; and
- Low-voltage alternating current/direct current supply.

Construction and operations access to the onshore substation site will be from the east via Railroad Place. Railroad Place is an existing road under the jurisdiction of the Village of Island Park that connects to Long Beach Boulevard to the east, and dead-ends at the Long Island Rail Road (LIRR) right-of-way to the west. The onshore substation facility is proposed to be located across Railroad Place, both to the north and to the south of the existing roadway, where it abuts the LIRR right-of-way. An access gate will provide entrance to the northern portion of the onshore substation site from Railroad Place, which will be relocated across the onshore substation site. A new permanent access driveway is proposed within the southern portion of the onshore substation site, which may replace/relocate the access provided by Railroad Place and connect to the LIRR right-of-way. The onshore substation site will be contained within a perimeter fence that will be up to approximately 10 feet (ft) (3 meters [m]) high, constructed of chain link, welded wire, or similar material, with an up to 2-ft (0.6-m)-tall barbed wire extension. Parking spaces will be provided within the onshore substation fence line.

Within the perimeter fence of the onshore substation, enclosed buildings and/or walled structures will contain various equipment, such as the switchgears, transformers, control equipment and batteries. The outdoor electrical equipment within the perimeter fence will include the shunt reactors, main transformers, reactive compensation equipment and harmonic filters.

The onshore substation site will be elevated to protect facilities from potential flooding, up to a maximum of approximately 16 ft (4.9 m) NAVD88 on portions of the site. Elevated portions of the site will be located behind a proposed retaining wall within the perimeter fence line. Wall and site elevation will be finalized as part of the detailed facility design to be provided in the EM&CP; however, the maximum height of the proposed facilities, including the site elevation and maximum building height, will be no more than 60 ft (18 m). As part of the onshore substation site development, the existing sea wall and bulkhead along the shoreline forming the southern portion of the onshore substation site may need to be retrofitted and/or replaced for site stabilization. The Applicant is currently evaluating the extent of shoreline stabilization that may be required. Approximately 650 ft (198 m) of bulkheaded shoreline may be upgraded or replaced along the southern border of the onshore substation. The Applicant also anticipates that three existing boat slips will be filled to provide stabilization for the access driveway and structures, and the existing marina structures located on site will be removed as part of the onshore substation development.

Building dimensions are provided on the onshore substation layout in **Exhibit 5**. The height of the GIS and control building above the current elevation will be a maximum total height of 60 ft (18 m), including proposed site elevation. The Applicant anticipates all other equipment on the site to be below the maximum height of the

GIS and control building. Lightning protection masts will be provided and may extend above the buildings. The building will be a combination of clad steel frame and concrete, designed to match the style and visual character of the surrounding area, and is proposed to be a light gray or white color. The Applicant will continue to work with local stakeholders throughout the permitting process and will submit final building architectural design details in its EM&CP for the NY Project.

Operational lighting will be installed for the onshore substation. The lighting plan is anticipated to include security lights, flood lights, roadway lighting and emergency lighting. Portable lighting may also be used, when required. A limited number of full cut off fixtures will provide site security lighting. The onshore substation will also contain outdoor lighting including static lighting masts. Pole-mounted flood lights will also be present on site. However, they will not be on at all times during operations; they will only be turned on for certain maintenance, inspection, and repair work at the onshore substation. Additional information on the lighting plan for the onshore substation will be provided as part of the Applicant's EM&CP.

E-2.3 Cable Terminations

Cable terminations will be located within the proposed onshore substation and at the Oceanside POI. The cable terminations within the onshore substation will be housed within the GIS and control building. An additional three cable terminations for the 345-kV interconnection cables will be located at the Oceanside POI within the expansion of the Barrett 138-kV Substation. The onshore export and interconnection cable terminations will be designed and are needed for safe termination. The cable terminations for the export and interconnection cables will be rated for substation design voltage classes 245-kV and 362-kV, respectively.

E-2.4 Facility Construction

The construction and installation of the onshore substation will comply with local and state regulations and guidelines, as applicable (see **Exhibit 7: Local Ordinances** for local compliance information and requested waivers). The anticipated construction and installation methodology is as follows:

- Establishment of site access;
- Site preparation, including clearing, utility/infrastructure removal or relocation, shoreline stabilization/bulkhead refurbishment, filling/grading (site elevation), retention wall installation, marina removal and excavation;
- Construction of the stormwater management system;
- Installation of the foundations and pilings;
- Construction of building(s);
- Installation of the electrical infrastructure and other associated structures and services;
- Connection to and relocation of existing local utilities; and
- Land reinstatement and paving.

Preliminary plans for the proposed onshore substation are provided in **Exhibit 5**. Additional description of site construction activities is also provided in **Exhibit 4**.

E-2.4.1 Construction Workspace and Laydown

Construction of the onshore substation will be predominantly located within the 5.2-ac (2.1-ha) onshore substation site. However, an additional temporary work area adjacent to the onshore substation will be required during installation of the onshore export cables underneath Reynolds Channel via horizontal directional drill, which will terminate within the onshore substation site. The total construction work area for the onshore

substation, including the space required for the horizontal directional drill, will be 5.4 ac (2.2 ha). This temporary construction work area outside of the perimeter fence line of the onshore substation will be restored to pre-construction conditions, to the extent practicable, following construction activities. If required, other nearby parcels may also be used for vehicle parking, work trailers, cable and equipment storage, storage and management of excavated soil, construction equipment, and temporary material storage. Details on any additional staging and laydown areas necessary for construction of the NY Project, if applicable, will be provided within the Applicant's EM&CP.

The Applicant anticipates delivering materials and equipment to the onshore substation site via truck routes. Deliveries will normally take place during regular business hours; however, some deliveries may be scheduled to avoid the morning and evening rush hours. The Applicant will develop a Traffic Management Plan, to be developed in coordination with, and approved by, the affected local municipalities. The Applicant will provide security measures to monitor and will properly mark active construction sites.

E-2.4.2 Construction Crews

During peak onshore construction, the Applicant anticipates approximately 220 construction workers onsite. At the onshore substation site, construction crews will typically include supervisory staff, equipment operators for excavation, cranes and machinery, welding crews, electrical crews, general laborers, and inspection staff. All construction crews will be required to follow applicable worker safety regulations, including Occupational Safety and Health Administration and the National Fire Protection Association regulations, and will be trained on applicable NY Project health and safety plans.

E-2.4.3 Site Control

The onshore substation will be equipped with monitoring equipment that will notify the Applicant of any equipment faults, unexpected shutdowns, and/or any other issues. Infrastructure and equipment will be designed to be able to withstand extreme conditions (e.g., heat, cold, weather) and will be protected both externally and internally by a lightning protection system. The onshore substation will be equipped with a diesel emergency generator as a back-up system in the event that power is lost.

Design and testing of protection systems will be in accordance with requirements of applicable regulatory agencies. The onshore substation will also be inspected during operations, in accordance with regulatory requirements and manufacturer recommendations, which may result in routine maintenance activities, including the replacement of and/or update to electrical components/equipment.

Only trained and qualified personnel will be allowed access to the onshore substation to perform operations and maintenance activities. The onshore substation will be secured with a fence and lock to prevent unauthorized access and any trespassing.

E-2.4.4 Fire Protection

The onshore substation facility will be designed to include a fire alarm and detection systems in the GIS and control building, and passive fire protection (fire walls) in the transformer and shunt reactor cells. The facility will be designed to meet applicable local fire code requirements and design standards.

Emergency Response Plans or similar types of documents will be developed to address the possibility of non-routine events (such as extreme weather, fire, or terrorist events). Relevant personnel will be provided training on the details of the Emergency Response Plans, including the site-specific emergency evacuation routes, warning signals, locations of fire extinguishers and first aid kits, as well as the chain of command.

E-2.5 Barrett 138-kV Substation Modifications

The Applicant anticipates that typical modifications required for interconnection will also occur at the existing Barrett 138-kV Substation, in addition to the construction of the planned expansion of the Barrett 138-kV Substation. Modifications at the existing Barrett 138-kV Substation may include the addition of control equipment, meters, telecommunication modifications, and modification to the existing high-pressure fluid filled cable system to accommodate the expansion scope. These modifications will include all the equipment necessary to safely connect to the NYISO transmission system and will be developed as part of the NYISO interconnection process.

The Applicant also anticipates LIPA will expand the Barrett 138-kV Substation to a nearby property at the corner of Daly Boulevard and Hampton Road, in Oceanside, New York, prior to interconnection. LIPA will install 345-kV GIS, 345-kV/138-kV transformers and a 138-kV GIS. The NY Project will interconnect at the 345-kV GIS located within this planned expansion. Anticipated upgrades as part of the substation expansion also include buildings to house the 345-kV and 138-kV GIS, a control building, and pump house. Required modifications or upgrades at the existing Barrett 138-kV Substation and for the substation expansion would be performed in accordance with the interconnection agreement.