

Empire Offshore Wind LLC

Empire Wind 1 Project
Article VII Application

Exhibit E-2
Other Facilities

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ACRONYMS AND ABBREVIATIONS

ac	acre
ConEdison	Consolidated Edison Company of New York, Inc.
EM&CP	Environmental Management & Construction Plan
Empire, the Applicant	Empire Offshore Wind LLC
EW 1	Empire Wind 1
ft	foot
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
m	meter
mi	mile
nm	nautical mile
NYISO	New York Independent System Operator, Inc.
NYSPSC or Commission	New York State Public Service Commission
POI	Point of Interconnection at the Gowanus 345-kV Substation
Project	EW 1 Project transmission facilities in New York
SBMT	South Brooklyn Marine Terminal

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 1 (EW 1) Project as one of two separate offshore wind projects to be located within the Bureau of Ocean Energy Management-designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The proposed transmission system for the EW 1 Project will connect the offshore wind farm to the point of interconnection (POI), and will include 230-kilovolt (kV) export and 345-kV interconnection lines traversing a total of approximately 17.5 miles (mi) (15.2 nautical miles [nm], 28.2 kilometers [km]) within the State of New York. An electric transmission line with a design capacity of 125 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. This application is being submitted to the Commission pursuant to Article VII of the New York Public Service Law for the portions of the EW 1 Project transmission system that are located within the State of New York (collectively, the Project).

The Project will interconnect to the New York State Transmission System operated by the New York Independent System Operator, Inc. (NYISO) at the Gowanus 345-kV Substation (the POI). The Gowanus 345-kV Substation is owned by the Consolidated Edison Company of New York, Inc. (ConEdison). The Project's onshore facilities, including the onshore cable route, onshore substation, and the POI, are located entirely within Brooklyn, Kings County, New York.

The Article VII components of the EW 1 Project include:

- Two three-core 230-kV high-voltage alternating-current (HVAC) submarine export cables located within an approximately 15.1-nm (27.9-km)-long submarine export cable corridor from the boundary of New York State waters 3 nm (5.6 km) offshore to the cable landfall in Brooklyn, New York;
- A 0.2-mi (0.3-km)-long onshore cable route and substation including:
 - Two three-core 230-kV HVAC EW 1 onshore export cables buried underground from the cable landfall either directly to the cable terminations or to a vault within the onshore substation;
 - An onshore substation located at the South Brooklyn Marine Terminal (SBMT), which will increase the voltage to 345 kV for the onshore interconnection cables; and
 - Two 345-kV cable circuits, each with three single-core HVAC onshore interconnection cables, buried underground 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 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 be located in a 9.0-acre (ac) (3.6-hectare [ha]) portion of SBMT adjacent to 1st Avenue/2nd Avenue in the neighborhood of Sunset Park in Brooklyn, New York. The onshore substation facilities will occupy a 4.8 ac (1.9 ha) portion of this site during operations. The parcel is owned by

New York City and leased to the New York City Economic Development Corporation. The Applicant or its affiliate will sublease the parcel.

The onshore substation will facilitate the connection of the power generated by the offshore wind farm into the Gowanus POI, which is owned by ConEdison. The onshore substation is needed to step up the voltage delivered to shore via 230-kV submarine export cables, after which the 345-kV interconnection cables will deliver power to the POI at the existing Gowanus 345-kV Substation. A description of the transmission lines associated with the 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 finalized 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-2.1.1 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 bus scheme of the facility will include a single 230-kV bus. A GIS and control building will also be housed at the site, along with a second GIS building, reactive compensation building, and harmonic filter building. 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;
- 230-kV alternating current filters;
- 230-kV capacitor banks, as needed;
- 345-kV and 230-kV indoor GIS containing:
 - circuit breakers;
 - disconnectors;
 - earth switches;
 - voltage and current transformers;
 - A static synchronous compensator; and
 - cable terminations;
- a diesel generator;
- a low-voltage switchboards;
- low-voltage alternating current/direct current supply; and
- substation auxiliary transformers.

Construction and operations access to the onshore substation site will be from the northeast, along an access driveway to be constructed within the SBMT site from an entrance off 29th Street. A gravel or paved

maintenance access road will also be located inside the perimeter of the onshore substation, which will be contained within an up to 10-foot (ft) (3-meter [m]) high perimeter fence, constructed of chain link, welded wire, or similar material, with an up to 2-ft- (0.6-m-) tall barbed wire extension. The perimeter fence will have a minimum of one drive-through gate and one walk-through gate to provide entrances into the onshore substation from the access road and the rest of the SBMT site. 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, batteries, reactive compensation equipment, and harmonic filters. The outdoor electrical equipment within the perimeter fence will include the shunt reactors, main transformers, reactive compensation equipment, and riser structures to bring the onshore export cable the surface.

Building dimensions are provided on the substation layout in **Exhibit 5**. The GIS and control building will be up to a maximum total height of 49 ft (14.9 m), including 9-ft (2.7-m) support columns. All other buildings on the site will be up to a maximum height of 40 ft (12 m). Lightning protection on the buildings may extend up to a maximum of 75 ft (22.9 m). Buildings will be a combination of clad steel frame and concrete buildings, designed to match the style and visual character of the surrounding urban landscape, and are proposed to be painted 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 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 contain approximately eight static lighting masts up to a height of approximately 30 ft (9 m). 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 Project's EM&CP.

The Applicant is also considering use of portions of the SBMT site for a construction port and staging area for the offshore wind farm. Upgrades and improvements by port facilities that may be utilized by Empire as construction and staging areas to support the offshore wind farm are not assessed within this Exhibit. (The staging areas for the Article VII facility are within the Project site as defined within this application.) Permits necessary for the improvement of port and construction/staging facilities supporting the offshore wind farm will be the responsibility of the owners of these facilities. The Applicant expects such improvements will broadly support the offshore wind industry and will be governed by applicable environmental standards, which Empire will comply with in using the facilities.

E-2.2 Cable Terminations

Cable terminations will be located within the proposed onshore substation at SBMT and at the POI at the existing Gowanus 345-kV Substation. The cable terminations within the onshore substation will be housed within the GIS and control building and will consist of 230-kV terminations for the two submarine/onshore export cables. Two cable terminations at the existing Gowanus 345-kV Substation will be for the 345-kV interconnection cables. The export and interconnection cable terminations will be designed and are needed for safe termination and will be rated for substation design voltage classes 245 kV and 362 kV, respectively.

E-2.3 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, excavation, utility/infrastructure removal or relocation, and filling/grading (if necessary); may also include remediation activities under the voluntary Brownfield Cleanup Program, if applicable (see **Exhibit 8: Other Pending Filings**);
- Construction of the stormwater management system;
- Installation of the foundations and pilings;
- Construction of buildings;
- Installation of the electrical infrastructure and other associated structures and services, including
- Connection to local utilities; and
- Land reinstatement and paving.

Preliminary plans for the proposed onshore substation are provided in **Exhibit 5**.

E-2.3.1 Construction Workspace and Laydown

Construction of the onshore substation will require additional temporary work area. The total work area for the onshore substation will be 9.0 ac (3.6 ha), of which only 4.8 ac (1.9 ha) will be occupied by the operational facility. The remaining 4.2 ac (1.7 ha) will be used for temporary staging, laydown, and parking during construction. This area is expected to be restored following construction activities, or else developed for facilities outside of the scope of this application. 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 Project, if applicable, will be provided within the Project's EM&CP.

The Applicant anticipates delivering materials and equipment to the onshore substation site by either truck routes or via barge. Delivery to SBMT 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.2.3.2 Construction Crews

During peak onshore construction, the Applicant anticipates approximately 150 construction workers onsite. At the onshore substation site, construction crews would 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 Project health and safety plans.

E-2.3.3 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. Project infrastructure and equipment will be designed to be able to withstand extreme conditions 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-2.3.4 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-2.4 Gowanus 345-kV Substation Modifications

The Applicant anticipates that typical modifications required for interconnection will also occur at the POI within the existing Gowanus 345-kV Substation. Modifications at the Gowanus 345-kV Substation may include the addition of circuit breakers, switches, meters, cable terminations and/or telecommunications modifications. These modifications will include all the equipment necessary to safely connect to the NYISO transmission and will be developed as part of the NYISO interconnection process. If required, modifications or upgrades at the existing Gowanus 345-kV Substation would be performed by ConEdison in accordance with the interconnection agreement.