



ANBARIC DEVELOPMENT PARTNERS, LLC

JUNO
POWER EXPRESS

JUNO POWER EXPRESS

(Case 22-T-0157)

EXHIBIT E-4

ENGINEERING JUSTIFICATION

Prepared Pursuant to 16 NYCRR § 88.3

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Figure E4-1 Juno Power Express and Relationship to other Transmission Facilities

ACRONYMS

ANSI	American National Standards Institute
CRIS	Capacity Resource Interconnection Service
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
kV	Kilovolt
LIPA	Long Island Power Authority
MW	Megawatt
NERC	North American Electric Reliability Corporation
NM	Nautical Miles
NPCC	Northeast Power Coordinating Council
NYISO	New York Independent System Operator's
NYSERDA	New York State Energy Research and Development Authority
NYSRC	New York State Reliability Council
OCP	Offshore Collection Platforms
RFP	Request for Proposal
SRIS	System Reliability Impact Studies
XLPE	Cross-Linked Polyethylene

EXHIBIT E-4: ENGINEERING JUSTIFICATION

E-4.1 Relation to Existing Networks

The Applicant has requested 1,200-megawatt (MW) of Capacity Resource Interconnection Service (CRIS) and Energy Resource Interconnection Service for the purposes of injecting the energy, net of power losses, produced by 1,200 MW of offshore wind generating capacity into New York Independent Service Operator (NYISO) Zone K, Long Island Power Authority's (LIPA) service territory. Juno Power Express will use High Voltage Direct Current (HVDC) and Voltage Source Converter (VSC) technology to provide capacity, energy, and ancillary services to Zone K.

The Facility will be a planned transmission system connecting offshore wind generators being developed by others, to the New York Control Area. The HVDC power will be transmitted through two bundled cables operated at up to ± 525 kilovolt (kV) HVDC, depending on the final design. The submarine portion of the route (Submarine Cable Route) will be between 89 and 142 miles, of which approximately 7.7 miles (6.7 nautical miles [NM]) will be in New York State waters. At Landfall at Jones Beach State Park, it will transition to an underground HVDC Land Cable. The HVDC Land Cable Route will be approximately 17.9 miles long and proceeds underground terminating at the Converter Station located on Ruland Road, in the Hamlet of Melville in the Town of Huntington, Suffolk County. The Facility's Cable Route, which is the subject of this Application, will be 26.2 miles long. The HDVC Cable System will include one fiber optic cable that will be bundled with the HVDC cables for the purpose of monitoring and control of the remote Converter Station.

The HVDC power will be converted to 345 kV High Voltage Alternating Current (HVAC) power at the Converter Station. The power will then be delivered to the LIPA Ruland Road Substation located approximately 0.6 miles southwest of the Converter Station. The Applicant has site control of the Converter Station property via a lease option agreement with the current owner. Delivery of power to the Ruland Road Substation will be provided by three-phase 345 kV HVAC circuits, two cables per phase, for a total of six 345 kV Cross-Linked Polyethylene (XLPE) insulated cables.

Figure E4-1 depicts the interconnection and its relationship to other transmission facilities.

Details of the design and installation of the Converter Station equipment are provided in Exhibit

E-2. All structures will be designed and constructed in accordance with the National Electric Safety Code and American National Standards Institute (ANSI) standards. The HVAC interconnections will be designed and constructed under the direction of LIPA. The final details of the interconnections will be in accordance with the requirements of the NYISO Interconnection Studies.

E-4.2 Reliability and Economic Benefits

Design of the Facility will meet or exceed reliability, protection, and control requirements and criteria of the North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Council (NPCC), New York State Reliability Council (NYSRC), the NYISO, and the connected transmission owner. Critical auxiliary equipment, controls, protections, metering and communications will include redundant systems to maximize availability and reliability.

Cables will be composed of copper with solid dielectric XLPE insulation. Installation details are provided in Exhibit E-3.

In the unlikely event a cable is damaged, established procedures for emergency repair of the cable will be followed. Spare cable, as well as converter station critical parts, will be kept in inventory at a location nearby the Converter Station to support emergency repairs.

The Ruland Road 138 kV Substation is the optimal interconnection point for serving load on Long Island. It is located in the heart of the Long Island load center as defined in LIPA's Transmission & Distribution Planning Criteria and Guidelines:

The Long Island load center is defined as the Eastern Nassau and Western Suffolk area bounded by the Newbridge and Holbrook interfaces, where close to 50 percent of the LIPA system load is located. Noteworthy in this definition is the substation loads along the Route 110 corridor, in Brentwood and in the Hauppauge Industrial Park area. Interface exports and imports are defined relative to the flow of energy to and from the load center (interface export is the flow into the load center; interface import is a flow out of the load center). The primary path for bulk power deliveries to LIPA's load center is across three internal bulk transmission interfaces: Newbridge Road, Northport, and Holbrook. These interfaces divide Long Island into western, central, and eastern regions.

The Long Island load center itself is defined to be located at the Eastern Nassau and Western Suffolk area bounded by the Newbridge Road and Holbrook interfaces. These interfaces are important for analytical purposes in determining the ability to deliver generating capacity across the LIPA system. The interface analysis shall utilize the contingency and performance criteria outlined in this document.¹

The Ruland Road 138 kV Substation is located within the Route 110 corridor referenced above and is optimally located for serving load on Long Island, which makes it an optimal location for the interconnection.

The Converter Station and Offshore Collector Platform (OCP) will use HVDC technology, which is well suited for offshore wind. It allows for precise control of the renewable energy transfer with rapid response. The HVDC conversion process prevents the transmission line from acting as a new path for short circuit current between two HVAC systems, thereby reducing overload and transient impacts on the interconnected systems. It decouples the offshore wind generator from the grid and reduces mechanical stresses on wind turbines due to electrical transients and oscillations during onshore transmission network faults. HVDC offers significant reactive capability providing positive benefits by supplying voltage support and offers lower transmission losses compared to HVAC.

The HVDC Cable System interconnected with the OCP and the Converter Station will pose no new air emission sources, no water consumption or discharges, and less noise, traffic, neighborhood impacts, and land consumption, than new HVAC generation. The HVDC Converter Station technology requires a very small footprint and can be erected on less than four acres minimizing the impact on the surrounding community.

E-4.3 Date of Completion and Impact of Delay

The Applicant intends to respond to the announced NYSERDA Phase 3 OSW Solicitation, Purchase of Offshore Wind Renewable Energy Certificates Request for Proposals ORECRFP22-1 Release Date: July 27, 2022 and intends to meet in-service dates specified in the RFP. Delays in the in-service date will negatively impact New York State's 9,000 MW Goal for integration of offshore wind into the supply mix and delay the economic benefit of creating an offshore wind industry in New York described in Exhibit 6. Offshore wind will be a crucial step on the path to a carbon-neutral economy and a critical component in achieving the expanded Clean Energy

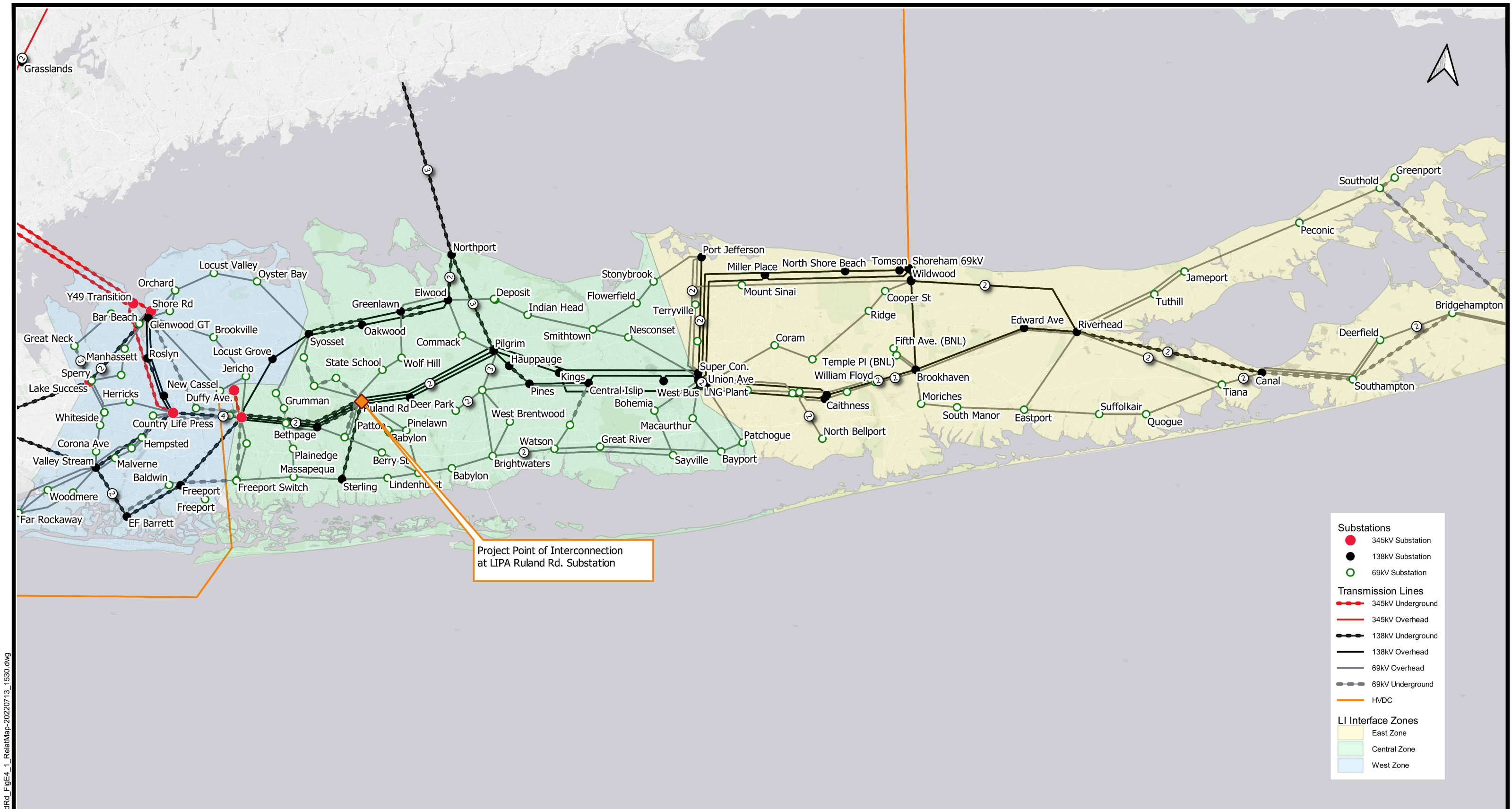
Standard, whereby 70 percent of New York's electricity will come from renewable sources by 2030 under the Climate Leadership and Community Protection Act, New York's ambitious and comprehensive climate and clean energy legislation. Delays in the in-service date will negatively impact the elimination of fossil-fuel sources of electric generation, which the Project will assist in, will delay the elimination of the negative economic consequences of carbon emissions due to long term public health impacts and economic disruptions associated with global warming.

E-4.4 System Impact Studies

The NYISO has completed the System Reliability Impact Study (SRIS), for Q-680 the Long Island Offshore Wind Connection, now identified as Juno Power Express, for the injection of up to 1,200 MW of offshore wind into Zone K at the LIPA Ruland Road 138kV Substation. The SRIS was completed in June 2021 (Appendix I) making the Project eligible for inclusion in the next Class Year Facilities Study.

The SRIS Report Concludes that the Project has no significant adverse impact on the reliability and operating characteristics of the New York State transmission system which could not be mitigated via the NYISO Minimum Interconnection Standard or System Upgrade Facilities.

FIGURES



Project Point of Interconnection
at LIPA Ruland Rd. Substation

Substations

- 345kV Substation
- 138kV Substation
- 69kV Substation

Transmission Lines

- 345kV Underground
- 345kV Overhead
- 138kV Underground
- 138kV Overhead
- 69kV Overhead
- 69kV Underground
- HVDC

LI Interface Zones

- East Zone
- Central Zone
- West Zone

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**EXHIBIT E-4: FIGURE E4-1
RELATIONSHIP TO OTHER
TRANSMISSION FACILITIES**

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