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Honorable Chair Ching Wah Chin
and Members of the Planning Board
John-Paul Rodrigues Operations Center
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Re: 381 N Highland Battery Storage Project – Site Details and Safety Memo

Honorable Chair Ching Wah Chin
and Members of the Planning Board:

The proposed Ossining Energy Storage 1, LLC ("Borrego") Public Utility Facility consisting of a lithium-ion battery storage system is being developed as a participant in the NYSERDA market acceleration bridge incentive program. This energy storage facility will be used for reducing peak demand on the electric distribution system, reducing strain on assets when the system needs it most, extending the life of existing electric infrastructure, reducing the frequency of blackouts and outages, and ultimately reducing the cost of electricity for ratepayers in the State of New York. This system was designed with in compliance with the 2019 Energy Storage Supplement to the New York State Uniform Fire Prevention and Building Code. All setbacks and lot size requirements will be met. The following is a summary of specific project related details:

System Design

The proposed project is for a 15000 kWh, 5000 kW battery storage system tucked into the back corner of lot 80.18-2-1. The batteries will be contained within two (2) sets of concrete-reinforced containers. The containers will be 15'W x 60'L x 10'H and completely sealed to weather and stormwater. The containers will sit on concrete footers. The area surrounding the containers within the fence line will be a permeable crushed stone.

The batteries will charge/ discharge via two (2) transformers and (2) power conversion systems located within the fenced area, each having an approximate area of 214ft^2. The power conversion system and associated equipment will be located on a concrete pad and connected to the existing utility grid via underground conduit from the interconnection equipment at the front of the site, adjacent to US 9/NY 9A/N Highland Ave. The underground conduit will be installed adjacent to the access road for approximately 740 LF to reach the interconnection equipment.

The interconnection equipment consists of a pad mounted disconnect box, a pad mounted high tension metering enclosure (both having an area of about 55 ft^2), and two (2) utility poles carrying vertically mounted interconnection equipment.

Driveway

The proposed access driveway will be a 20’ wide crushed stone designed to meet the loads of the design vehicles. The system will be unmanned so vehicle traffic will be limited to regular system maintenance and landscaping a couple times a year.

Fence

The fence will be a standard 7’ high fence per National Electric Code (NEC) requirements. with green slats to completely screen the system equipment from public view. There will be one (1) vehicle gate with Knox Box for access.

Lighting

There will be no additional continuous lighting for the system or parking lot. The battery containers contain two 18W LED, switch-controlled lights (on opposite sides of the battery container) and the external pad will contain a single dark sky compliant light. All fixtures are at low incident angles to reduce light pollution to abutting properties.

Stormwater

The total site disturbance will be less than an acre for the project (approximately 0.5 acres), therefore a SWPPP is not required by New York State. However, we will work with the Town to meet all applicable requirements of Chapter 168 of the Town Code. Erosion and sediment controls (silt fence, mulch tube, temporary seeding, etc.) will be provided throughout construction to ensure that construction activities will not impact the Hudson River or the 100’ buffer area as shown on the plans.

Flood Plain

Due to 60’ in elevation change from the Hudson/Croton River to the project site, the project is will above any potential flood plains and firmly within the boundaries of FEMA Zone X.

Wetlands

The project was delineated by environmental consultant GEI and confirmed there are no wetlands within the project area. The Hudson/Croton River is adjacent to the site and considered a NYSDEC Wetland and Town Water Body, however the project will avoid the 100’ buffer imposed by the Town Code in Chapter 105.

Endangered Species

NYSDEC has identified four (4) endangered or threatened species occurring within 0.5 miles of the site. We are working with environmental consultant GEI to prepare habitat reports for each species and receive concurrence from NYSDEC that the project will have no impacts to the species. The following is a list of each species and the reason the project will likely have no impacts.

- Bald Eagle – No proposed tree clearing to impact habitat or tall structures to impact flight patterns
- Least Bittern (Heron family) – Habitat consists of dense marshes, particularly cattails and reeds. The project site is separated from potential habitat in the Hudson/Croton River by a 60' elevation change. No additional wetlands were identified within the project area.
- Atlantic Sturgeon – Habitat within the Hudson/Croton River and separated by a 60' elevation change from project site
- Shortnose Sturgeon – Habitat within the Hudson/Croton River and separated by a 60' elevation change from project site

Battery Chemistry

Lithium-ion battery storage systems may be deployed several different material configurations with respect to the metal oxide making up the battery cathode (commonly referred to as "chemistries"). At the current state of art, there are two dominant chemistries for batteries used in stationary energy storage systems, electric vehicles and consumer electronics: Lithium Nickel Manganese Cobalt (NMC) and Lithium Iron Phosphate (LFP). Though each cathode chemistry has its strengths and weaknesses related to the performance and longevity of the system, the thermal and electrical properties are very similar. As such, the industry does not differentiate between these two chemistries with respect to safety measures, thermal controls, and fire detection and suppression.

Safety Description

Lithium-ion battery storage systems are safe and reliable grid assets. Borrego is highly focused on ensuring the safety of all systems we deploy and ensuring that local authorities and first responders are informed about all possible hazards and best practices for managing energy storage systems. We prioritize system safety throughout the design, procurement, construction, and operations and maintenance of our energy storage systems.

The battery energy storage system (BESS) will be built to all applicable UL safety standards with an overarching certification to UL 9540, a safety standard for energy storage systems. In compliance with the UL 9540 standard, the battery subsystems adhere to the following criteria:

- Battery cells are UL 1642 and IEC 62619 certified
- Battery modules are listed to UL 1973 and IEC61000-6
- Transportation conditions comply with UN/DOT 38.3

- Power conversion systems are listed to UL 1741SA

In particular, UL 1973 contains specific provisions for safety performance tests for the battery, including electrical tests (such as short circuit and failure of cooling/thermal stability tests), mechanical tests (such as drop and impact tests, mold stress tests, and pressure release tests), and fire tests, including both internal and external fire tests to determine that no explosion hazards exist in either case. The power conversion system will be third-party certified to UL 1741SA to ensure reliable and safe connection to the electrical grid.

Installation of the system will proceed in compliance with prevailing codes such as NFPA 1 and NFPA 70 (National Electric Code), as well as local electric and fire codes. Borrego strictly adheres to worksite policies that are enforced in parallel by an internal safety lead and an external contractor. In this way, we promote a consistent culture of safety while maintaining checks and balances on our own systems. Borrego retains an independent contractor, Smart Safety Group, to spontaneously audit Borrego job site safety on an ongoing basis.

System protection will be provided on the DC and AC side of the power conversion system as required by and often in excess of NFPA 70 as adopted by local authorities having jurisdiction (AHJs). Protective components include, but are not limited to, ground fault detection, power quality metering, thermal conditioning, emergency stop buttons, and many system limitations programmed into the battery management system (BMS), data acquisition system, and control systems. Basic system limitations include:

- PCS AC voltage and current
- PCS DC voltage and current
- PCS ramp rate
- PCS temperature
- Ambient temperature and humidity
- Rack level DC voltage and current
- Module temperature
- Cell voltage
- BMS power limit
- BMS state of charge
- BMS state of health

Because lithium-ion batteries are categorized as non-hazardous waste, due to the low quantity of toxic metals, and are contained within the battery cells, battery modules, and finally within a weatherproof NEMA 3R / IP55 enclosure, no dedicated containment is required. Lithium-ion batteries are sealed, manufactured systems and do not expose operators to toxic metals under normal operating conditions, so Tier I and Tier II reporting under EPRCA is not required. Safety data sheets are provided for all lithium-ion battery cells contained within the battery container.

Code Compliance

The proposed battery storage system has been reviewed extensively for compliance with prevailing national and local codes. Aside from the inherent safety features of the system, considerations have been made for signage, lighting, vegetation, and noise. Adequate signage will be provided for the system in compliance with ANSI Z535 and will identify the system as a lithium-ion battery energy storage

system, note the use of Novec 1230 fire suppressant, list 24-hour emergency contact information, and identify disconnecting and emergency shutoff devices for the system. All high voltage and hazardous components will be identified as such. . Combustible vegetation will be kept a minimum of 10ft from all equipment and ongoing system maintenance will ensure new growth does not enter the equipment area fence line. Ambient noise levels will peak at 82 decibels as measured 5 feet from the HVAC unit which will dissipate to 70 dB at 40 ft (the nearest property line).

New York's 2019 code supplement was specifically reviewed in the design of the proposed energy storage system to ensure compliance. These systems are typically characterized as outdoor, exposed installations. Due to the configuration of this site, the system will meet the more stringent codes that are applicable to indoor, dedicated-use, walk-in enclosures. Specifically, the system meets size, separation, and maximum quantity requirements as a dedicated-use structure. The enclosures are equipped with gas detection, smoke and automatic fire detection, fire suppression, and exhaust ventilation as a means for explosion control per the applicable indoor system requirements.

Fire Detection & Suppression

Fire protection for the energy storage system can be characterized in four tiers of hazard mitigation, prevention, detection and early warning, and passive and active response. The most consequential hazard associated with the operation of energy storage systems is potential battery thermal runaway, which is characterized by uncontrolled increase in heat dissipating from the battery module. Thermal runaway results from excessive thermal, electrical, or mechanical abuse dictated by installation or use out of compliance with manufacturer recommended handling.

Level 1
Once the system is installed, thermal and electrical abuse are the primary mechanisms which can lead to thermal runaway. To mitigate the likelihood of thermal abuse the BESS features a fully integrated HVAC and climate control system which keeps each cell operating within ambient temperature tolerances. Additionally, during operation of the energy storage system, the integrated battery management system (BMS) monitors electrical and environmental values and control charge cycles to ensure battery modules operate within manufacturer set parameters. Each battery module is equipped with internal temperature sensors for this purpose.

Level 2
Electrical abuse is also for thermal runaway prevention. The battery management system (BMS) contains manufacturer prescribed limits for minimum voltage, maximum voltage, charge current limit, discharge current limit, operating and non-operating temperature. If such pre-defined limits are exceeded during operation, the system trips offline thereby isolating the batteries and stopping power flow. Resuming operation requires a reset command with all faults and alarms cleared. The BMS can alert remote users when operating fault conditions occur.

Level 3

Where hazard mitigation and prevention fail to avoid a thermal runaway event, the BESS is equipped with a gas detection system for early alarm. This system is capable of sensing organic compounds that become vapor in a battery cell well ahead of the cell reaching thermal runaway conditions.

If all preceding prevention and early detection were to fail to stop a runaway event, a clean agent fire suppression system is designed into the battery enclosure. This system complies with NFPA 2001 and uses approved means for alarming and discharging the chemical agent (Novec 1230) to apply cooling in the container to stop fire reactions. As Novec 1230 is gaseous and held within the enclosure, no secondary containment is required. Borrego will work with local fire authorities and first responders as required to ensure that they understand the protections within the system.

Level 4
Finally, the battery container is a purpose-built concrete enclosure with a two-hour rated firewall and 90-minute rated steel doors.

Commissioning Plan

The commissioning will take place in three distinct parts to verify the functional performance of the BESS: mechanical completion, functional completion, and substantial completion tests. The commissioning procedures will utilize the batteries racks, battery modules, container, power conversion system, fire suppression system, SCADA system, HVAC systems and various other subcomponents of the overall system. These stages can further be characterized as follows:

- Mechanical Completion
    - Inverter inspection
    - Battery container inspection
    - Battery rack inspection
    - Open circuit voltage testing
    - BESS battery rack and container tests: lighting, HVAC
    - Fire suppression system verification and commissioning
- Functional Completion
    - Inverter commissioning: settings, firmware, control, metering, ramp rate
    - Battery commissioning: battery management system, internal and external communications
    - SCADA commissioning
    - Serial number mapping
- Substantial Completion
    - Capacity testing
    - Round trip efficiency testing
    - SCADA testing

The tests inherent in the commissioning plan are not directly reliant on the ambient environment and thus do not require precise conditions outside of those specified in the product warranties. Once the

functional and mechanical phases have been completed, steady grid voltage and frequency are required for the main feed as well as the auxiliary power feed in addition to the utility's permission to operate before capacity testing. Commissioning reports are finalized upon the completion of each period.

Emergency Response Planning

Each Borrego energy storage system is specifically addressed with a written emergency response plan. Through the process of project development, Borrego will engage the appropriate local officials (including fire and building departments) to develop a system specific emergency response plan into a site-specific plan. The plan will at a minimum consist of the following:

- Project contacts: operations, maintenance, and emergency response
- Remote monitoring
- Hazards
    - Chemical and toxicity
    - Electrical
    - Fire and explosion
    - Confined space
- Action plan
- Site information: access, layout
- Battery enclosure information: access, FSS overview, emergency stop

Once an approved emergency response plan has been completed, Borrego will support training in coordination with the local authorities to ensure understanding and compliance with the emergency response plan. The emergency response plan will identify and document qualified personnel to service, maintain and decommission the facility, and respond to incidents involving the facility.

Safety is our top priority at Borrego and installing energy storage systems is no different. After reviewing the 2019 Energy Storage Code Supplement and the NYSERDA Guidebook for Energy Storage, we have full confidence in the passive and active safety systems we intend to employ for the project and see no significant hazards created by the facility. Please don't hesitate to reach out with any questions.

Sincerely,

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