For May 5, 2023, TPAS Recommendation
For May 18, 2023, OC Approval

System Impact Study Scope - Transmission Interconnection Project

Queue #1366: Queensboro Renewable Express Circuit B Project

1. Purpose

The purpose of this Interconnection System Impact Study ("SIS" or "Study") is to evaluate the impact of the proposed interconnection of Queensboro Renewable Express Circuit B ("Project"), which is being developed by Queensboro Development, LLC ("Developer"), on the reliability of the New York State Transmission System ("NYSTS") under the NYISO Transmission Interconnection Standard. The Study will be performed in accordance with Attachment P of the NYISO Open Access Transmission Tariff ("OATT").

The Project is a 400-kV DC system with a nominal capacity of 1,310 MW. The proposed Point of Interconnection ("POI") will be at the Consolidated Edison Company of New York ("Con Edison") Rainey 345 kV substation and Vernon 138 kV substation located in Queens County, New York. The Developer proposes to retire Ravenswood Steam Turbine Unit 01 (ST1) and Unit 02 (ST2) and utilize ST1 and ST2 breaker positions at Vernon 138 kV substation for this Project – specifically ST1 breaker positions 1E, 8E, G1E, 8W,1W and G1W and ST2 breaker positions 3E, 4E, G2E, 3W, 4W, and G2W. The Project will consist of the following components:

Components previously added with Q1365[1]

- New Ravenswood ring bus substation with four (4) breakers 345 kV
- Two (2) 345 kV circuits from new Ravenswood 345 kV substation to Rainey 345 kV substation, approximately 800 feet in length.
    - Circuit 1 tied into Rainey 345 kV between new breakers 8E1 and 8E2.
    - Circuit 2 tied into Rainey 345 kV between new breakers 8W1 and 8W2.
- One (1) 345 kV GIS bus connection from new Ravenswood 345 kV substation to onshore converter station A
- Onshore converter station A and associated equipment
- Offshore converter station A and associated equipment
- A 105-mile 400-kV symmetrical monopole HVDC cable that connects offshore converter station A to onshore converter station A
- Two (2) 138 kV circuits, each approximately 1500 feet, from new Ravenswood 345 kV substation to Vernon 138 kV substation connected via 345 kV/138 kV transformer and 345 kV PAR
    - Circuit 1 tied into Vernon 138 kV at breaker G1E (currently ST1 position)
    - Circuit 2 tied into Vernon 138 kV at breaker G1W (currently ST1 position)
- 345 kV bus, which connects the 345 kV/138 kV transformer and 345 kV PAR

[1] Queensboro Renewable Express Circuit A project

- 345 kV/138 kV transformer
- 345 kV PAR

New Components with Q1366

- Expand new Ravenswood 345 KV substation that was established with project Q1365 from 4-breakers ring substation to 6-breaker ring substation.
- Two (2) 138 kV circuits, each approximately 1500 feet, from new Ravenswood 345 kV substation to Vernon 138 kV substation connected via a 345 kV/138 kV transformer and 345 kV PAR.
  - Circuit 1 tied into Vernon 138 kV at breaker G2E (currently ST2[2] position)
  - Circuit 2 tied into Vernon 138 kV at breaker G2W (currently ST2 position)
- 345 kV bus, which connects the 345 kV/138 kV transformer and 345 kV PAR
- 345 kV/138 kV transformer
- 345 kV PAR
- One (1) 345 kV GIS bus connection from new Ravenswood 345 kV substation to onshore converter station B
- Onshore converter station B and associated equipment
- Offshore converter station B and associated equipment
- A 105-mile 400-kV symmetrical monopole HVDC cable that connects offshore converter station B to onshore converter station B
- This is a transmission project only. No new generation is being added.

The Connecting Transmission Owner ("CTO") is Consolidated Edison Company of New York, Inc. ("Con Edison"). The Project proposes an In-Service Date of April 2029.

The Study will assess the impact of the Project on the base case power system including potentially Affected Systems: *NYPA and PJM Interconnection.* It will provide a list of the facilities (Network Upgrade Facilities) required to reliably interconnect the Project, and non-binding good faith estimates of cost and time to construct those facilities.

The Study will be conducted in accordance with the Applicable Reliability Standards.

2. Interconnection Plan

The Study will include a description of the proposed facilities and the conceptual design of the interconnection to the system representation. The description will include a breaker one-line diagram depicting the proposed facilities and their integration with the existing facilities. The Study will also identify potential issues with the feasibility/constructability of the conceptual design of the proposed interconnection to the extent known based on the Study assumptions.

[2] Ravenswood Steam Turbine Unit 02 (PTID 23534)

3. Study Period

The Study will be based on NYISO Class Year 2021 ATBA base cases ("Base Cases") that have the 2021 FERC 715 2026 system representation, or the Class Year 2023 ATBA base cases that have the 2023 FERC 715 2028 system presentation if available prior to the start of the analyses identified in this scope ("Base Cases"). The Study will be conducted using the steady state, stability, and short circuit Base Cases provided by the NYISO, and will include the representation of proposed projects that have already been cost allocated, up to and including Class Year 2021 (as listed in Appendix A of this scope).

4. Study Area

The Study will identify and evaluate the impact of the Project on the 138 kV and above portions of the NYSTS in the following New York load zones: Zone **I** (Dunwoodie) and Zone **J** (New York City) that are most likely to be affected by the Project. The Study will also evaluate the impact of the Project on the local system (below 138 kV) in the electrical proximity to the Project.

5. Base Case Conditions

The impact of the proposed Project will be evaluated for **summer** peak**, winter** peak**,** and **light** load cases for the following base case conditions, and as specified under the subsequent sections of this Scope:

Case 1- Base Case without the Project. The Base Cases will include the baseline system and the proposed projects listed in Appendix A of this scope. The short circuit Base Case will model all the projects as in-service. The steady state Base Case will normally model all projects as in-service and at full output but may model some projects as out-of-service or at less than full output as necessary to establish a feasible base dispatch. Ravenswood ST1 and ST2 units are assumed out-of-service. Generation will be dispatched in accordance with the NYISO Minimum Interconnection Standard.

Case 2 - Case 1 with the Project modeled as in-service.

6. Analysis

Thermal, voltage, stability and short circuit analyses will be conducted to assess the performance of the base system conditions within the Study Area, with and without the Project, in accordance with Applicable Reliability Standards, guidelines and study practices. Modifications to Base Cases, during analyses, will be documented in the Study Report.

6.1 Steady State Analyses: N-0 and N-1

Thermal and voltage steady state analyses, using PSS/E or a comparable load flow program, will be conducted for **summer** peak and **winter** peak load cases, pre-contingency and also for relevant Design Criteria Contingencies conditions, and will be limited to the Study Area.

Thermal limits will be assessed under both Normal Criteria and Emergency Criteria, using normal ratings pre-contingency and applicable post-contingency ratings *(e.g.*, Long-Term-Emergency, LTE, ratings or Short-Term-Emergency, STE, ratings).

Voltage limits will be assessed, pre- and post-contingency, using the applicable voltage limits.

6.2 Steady State Analysis: N-1-1

The Study will evaluate a limited selection of N-1-1 contingencies around the POI. Steady state analyses (**summer** peak and **winter** peak) will be performed based on the N-1-1 contingency descriptions provided by the CTO(s) and/or the NYISO.

6.3 Transfer Assessments

The transfer assessment will determine the incremental impact of the Project on the Normal and Emergency transfer limits of the Dunwoodie South, and NY-PJM/PJM-NY[3] interface (opened and closed definitions, as applicable) in accordance with Applicable Reliability Standards, Guidelines and NYISO study practices. The transfer limits will be evaluated in the predominant north-to-south direction, unless otherwise specified. Sufficient analyses will be conducted to determine the most limiting of the thermal, voltage, or stability limits under **summer** peak load conditions.

6.4 NPCC A-10 Testing

The Study will review the NPCC Bulk Power System (BPS) classification of existing and proposed stations within the proximity of the Project to identify any existing or new stations that could be classified as BPS due to the addition of the Project. This testing will be performed for **summer** peak and **light** load cases, and in accordance with the latest NPCC A-10 criteria (npcc.org).

6.5 Short Circuit Analysis

Short circuit analysis will be performed, using ASPEN, to evaluate the impact of the Project on system protection and adequacy of existing circuit breakers, other fault current

[3] Thermal limit impacts only.

interrupting devices, and related equipment. All Project impacts of 100 A or more will be identified.

This analysis will be performed in accordance with the NYISO Guideline for Fault Current Assessment (Attachment I of the NYISO Transmission Expansion and Interconnection Manual), and in accordance with Connecting Transmission Owner and Affected System(s) criteria, to the extent such criteria are recognized as Applicable Reliability Standards.

6.6 PARs Impacts

The Project's impact on the NY-NJ Phase angle regulators ("PARs") operation and control ranges will be assessed and reported.

6.7 Stability Analysis

Stability analysis, using PSS/E v34, will be performed for **summer** peak and **light** load conditions to determine the impact of the Project on system performance within the Study Area. This analysis will evaluate the performance of the system for Design Criteria Contingencies and will address issues including, but not limited to, transient stability, dynamic stability *(i.e.*, damping), critical clearing time, coordination of protection and control systems, and performance of any Special Protection Systems that may be affected. These analyses will explicitly consider the voltage and frequency ride-through capabilities of the facility.

6.8 Sub-synchronous Torsional Interaction Screening

Using a short circuit analysis software, a screening study shall be performed to identify Unit Interaction Factors relating to the degree of electrical coupling of the Project to synchronous generators interconnected with the Con Edison transmission system. Third level (N-3) contingency conditions shall be considered.

6.9 Feasibility Analyses

Bus Flow Analysis will be performed by Con Edison.

Bus Flow Analysis, using PSS/E or a comparable load flow program, will be conducted for summer peak case, and will determine thermal adequacy of the major existing and proposed equipment (buswork, circuit breaker and disconnect switches) at the POI station.

Physical Feasibility Analysis will identify physical feasibility of the proposed Project's interconnection at the CTO(s) substation(s) in accordance with the Transmission Developer provided one-line diagram.

7. Modeling Assumptions

7.1 Phase angle regulators ("PARs"), switched shunts, and LTC transformers will be modeled as regulating pre-contingency and non-regulating post-contingency. The Study will use PAR schedules established by the NYISO in coordination with the neighboring ISOs through the NERC and NPCC base case development processes. PARs may be adjusted as necessary to relieve pre-contingency overloads.

7.2 SVC and FACTS devices will be set to zero pre-contingency and allowed to operate to full range post-contingency.

8. Evaluation and Identification of Upgrades

If the Study results indicate that the Project, as proposed, would result in violations of Applicable Reliability Standards, analyses will be performed to identify any Network Upgrade Facilities that would be required to meet the NYISO's Transmission Interconnection Standard. When such upgrades are identified, sufficient re-assessments (among those identified in this scope) should be performed in order to assure that the upgrades do not cause any adverse reliability impact on the Study Area.

9. Cost Estimates of Facilities and Time to Construct

A description of facilities required to interconnect the Project to the NYSTS, and non-binding good faith estimates of cost and time to construct those facilities will be provided.

10. Report

The Study Report will document the summary of the results relevant to the project impacts, project description, project modeling, study assumptions, criteria and methodology, mitigation solutions and their impact assessment, and conclusions, for each of the analyses identified in this scope.

Appendix A

List of Other Proposed Projects to be Modeled in the Base Case

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Queue Pos.	Owner / Project Name	MW (S/W)
521	Bull Run Energy LLC / Bull Run II Wind	449|449
571	Heritage Renewables, LLC / Heritage Wind	200.1|200.1
629	Silver Lake Solar, LLC / Silver Lake Solar	24.9|24.9
631	CHPE LLC / NS Power Express	1000|1000
710	Horseshoe Solar Energy LLC/ Horseshoe Solar	180|180
717	EDF Renewables Development, Inc. / Morris Ridge Solar Energy Center	177|177
758	Sithe/Independence Power Partners, LP / Sithe Independence	9|27
766	Sunrise Wind LLC / Sunrise Wind	880|880
783	ConnectGen Chautauqua County LLC / South Ripley Solar and BESS	270|270
787	Levy Grid, LLC / Levy Grid, LLC	150|150
801	Prattsburgh Wind, LLC / Prattsburgh Wind Farm	147|147
805	Oxbow Hill Solar, LLC / Oxbow Hill Solar	140|140
811	Hecate Energy Cider Solar LLC / Cider Solar	500|500
815	Bayonne Energy Center / Bayonne Energy Center III	49.8|49.8
835	Astoria Generating Company, LP / Luyster Creek Energy Storage 1	56|56
840	Hecate Energy LLC / Swiftsure Energy Storage	650|650
864	Greens Corners Solar LLC / NY38 Solar	120|120
883	Garnet Energy Center, LLC / Garnet Energy Center	200|200
887	CHPE LLC / CH Uprate	250|250
907	Harlem River ESS, LLC / Harlem River Yard	100|100
929	EDF Renewables Development, Inc. / Morris Ridge Battery Storage	83|83
931	East River ESS, LLC / Astoria Energy Storage	100|100
956	Holtsville 138 kV Energy Storage	110|110
959	Empire Offshore Wind LLC / EI Oceanside 2	1260|1260
987	Sunrise Wind LLC / Sunrise Wind 2	44|44