

LOCAL TRANSMISSION PLAN

PRESENTATION TO NYISO / INTERESTED PARTIES

October 23, 2019

Transmission Planning



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ISLAND

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LTP Contents: Topics that will be Covered

- Overview of LIPA T&D
 - Background
 - Transmission System
 - REV Initiatives/Utility 2.0
- Key Factors Considered
- Planning Horizon
- Data and Models Used
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- Transmission Planning Studies
 - Planning Process
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 - NYISO Interconnection Requests/Ongoing Efforts
 - PSEG – LI Definition of a “Firm” Project
 - Long Island Load Pockets
 - Projects Being Considered

Background

- LIPA owns electric Transmission and Distribution (T&D) system on Long Island
- Acquired from LILCO in 1998
- Power Supply Agreement to meet capacity and energy needs for LIPA system with National Grid renewed in 2013, out to 2028
- Operation Service Agreement to manage electric operations for LIPA's system for 12 years starting January 2014 with PSEG Long Island.
- LIPA, by and through its agent, PSEG Long Island LLC, provides electric service to approximately 1.1 million LIPA customers
- LIPA service area includes Nassau County, Suffolk County, and the portion of Queens County known as the Rockaways, in the State of New York

Transmission System

- LIPA's transmission system is designed to provide adequate capability between generation sources and load centers.
 - Over 1,370 miles of transmission (345 kV, 138 kV) and sub-transmission lines (69 kV, 34.5 kV, 23 kV), delivering power through 182 substations in its electric system.
- Interconnections:
 - Two 345 kV
 - Con Ed: Y49 (NYPA) 637 MW, East Garden City to Sprain Brook (NYISO-BPS)
 - Con Ed: Y50 (LIPA/Con Ed) 653 MW, Shore Road to Dunwoodie (NYISO-BPS)
 - Three 138 kV:
 - ISONE: NNC (LIPA/ES) 436 MW, Northport to Norwalk Harbor
 - Con Ed: Lake Success to Jamaica (903) and Valley Stream to Jamaica (901), Total 300 MW wheel
 - Two HVDC:
 - PJM: Neptune 660 MW, Newbridge Road to Sayreville
 - ISO-NE: CSC 330 MW, Shoreham to New Haven

REV Initiatives/Utility 2.0

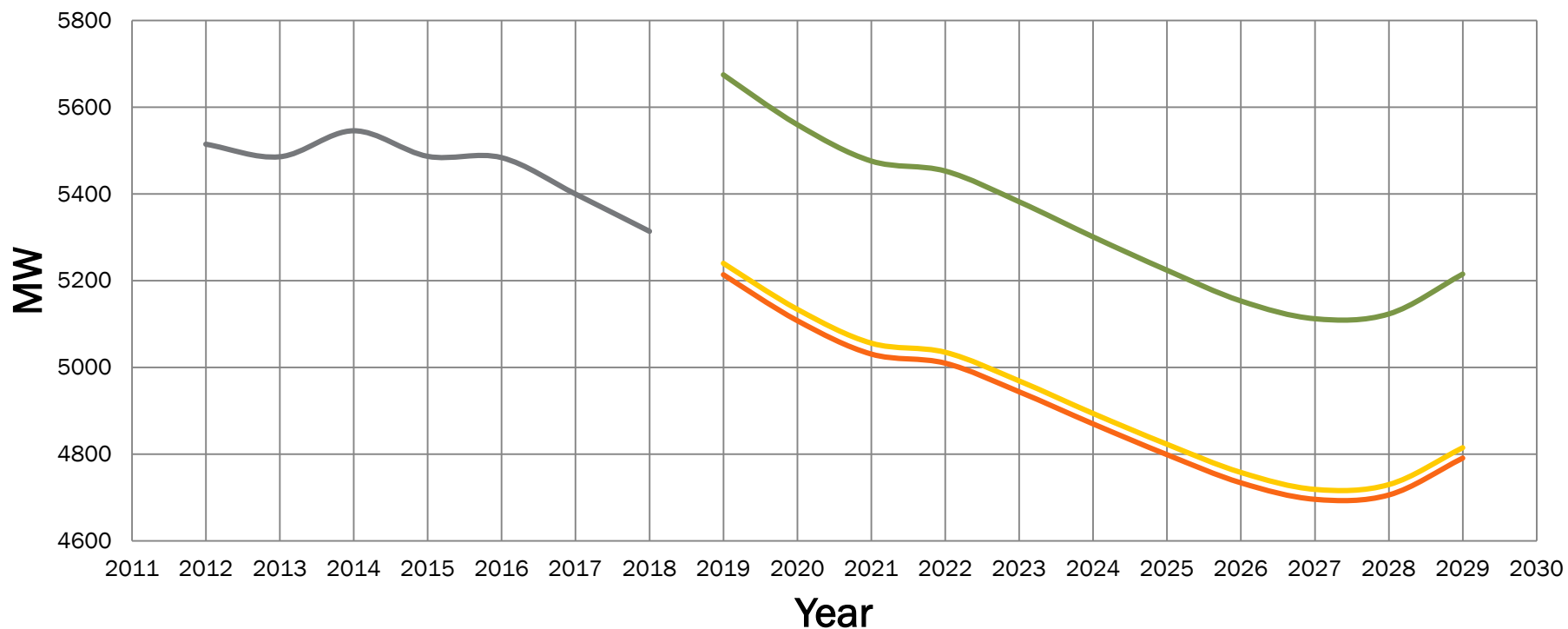
- South Fork Projects
 - Offshore Wind Energy Project (130 MW)
 - East Hampton and Montauk Energy Storage Projects (5 MW each – In Service as of 01/2019)
 - Direct Load Control and Energy Efficiency measures (8.2 MW of relief - Ongoing)
- Annual Update of the Long Range Plan
- <https://www.lipower.org/wp-content/uploads/2019/08/2019-06-28-PSEG-Long-Island-Utility-2.0-2019-Annual-Update.pdf>

Key Factors Considered

- Load Growth
- Transmission Planning Criteria
 - PSEG LI Transmission Planning Criteria
 - <https://www.psegliny.com/aboutpseglongisland/-/media/9EFC22D5FA1246F0B5E5371EA6A96AD3.ashx>
 - Ensure that electric system will meet applicable reliability requirements (NERC/NPCC/NYSRC)
 - PSEG LI performance requirements for Transmission-Connected resources using non-synchronous generation
- Targeted Resource Additions
 - South Fork Projects
- Local Dispatch Guidelines
 - Gas Burn Reliability Rules & Transient Recovery Voltage
 - Load Pockets

Planning Horizon

10 Year Peak Forecast



- Weather Normalized Actual Peak
- Gold Book: NYISO 2019 Baseline Coincident Peak, Table I-3a
- Gold Book: NYISO 2019 Baseline Non-coincident Peak, Table I-4a
- Gold Book: NYISO 2019 90th Percentile Baseline Coincident Peak, Table I-7a

Data Sources

- Load Forecast
- NYISO - The Major Source of Base Cases used in Modeling
 - Load Flow
 - Fault Duty
 - Stability
- Generator Owners/HVDC/FACTS Developers
 - MW/MVAR Capability
 - Modeling Characteristics
- Internal Sources
 - EMS Data – PI Historian
 - Equipment Characteristics (e.g., Engineering, Operations)

Models - Major Tools Used

- **Thermal / Voltage Analysis**
 - PSS®E : Siemens Power Technologies International's (PTI) Power System Simulator
 - Transmission system load flow; thermal, voltage under normal and contingency conditions
 - TARA : PowerGEM's steady state power flow software tool
 - Load flow studies, N-1-1 power flow analysis and system operating limits analysis
 - MAPS™ : General Electric's (GE) Multi-Area Production Simulation
- **Fault Duty**
 - ASPEN™ : Advanced Systems for Power Engineering, Inc.; Short circuit analysis program
 - Breaker fault duty analyses
- **Stability**
 - PSS®E : Siemens Power Technologies International's (PTI) Power System Simulator
 - System Dynamic Simulation
 - Complex Load Model used for Transient Voltage Recovery Studies
- **Other**
 - Python: Software language utilized for automation of various analysis and data management

Planning Process

- The planning process for the T&D System begins with the load forecast.
- Transmission System Studies: Identify transmission system limitations and recommend reinforcements for an area of the system.
 - Results in the development of major transmission capital projects.
- Limiting load level and year at which this load level is reached are critical factors
- Potential Risk Factors
 - Generator unavailability
 - Generator Deactivations
 - Higher Load Levels

Study Overview

- **Seasonal Studies**
 - System Operating Studies (Summer & Winter) – Highlight system limits/deficiencies and recommend solutions for the upcoming peak season
 - Operating Guidelines – Provide information to Transmission Operations to address thermal, voltage, local reliability rule, or short circuit constraints
- **Short Term, Near Term, & Long Term Studies (Current year, Five year, and 10 year assessments)**
 - Area Studies – Identify area constraints and recommend solutions
 - Ten year Transmission development plan – Ensure the design of the LIPA transmission system conforms with applicable reliability criteria over the planning horizon
- **Compliance Studies**
 - Studies to address requirements of NERC reliability standards (NERC TPL-001-4, TPL-007, FAC-014 and FAC-002-2)

Study Overview – Other Major Studies

- **NYISO Interconnection Process**
 - To assess the impact on the LIPA transmission system of proposed new generation or transmission interconnections
- **Short Circuit Study**
 - Ensures that there are no overstressed circuit breakers
- **Angular Stability Study**
 - Ensures that electric system will meet system stability design criteria
- **Voltage Recovery Evaluation**
 - Impact of load types and resource dispatch
- **NYISO coordination efforts**
 - RNA, Deactivation studies, etc.
- **New York State Policies / Public Policy Initiatives**
 - Clean Energy Standard, Offshore Wind Master Plan, Large-Scale Renewable Program, DEC NOx Peaker Rule

NYISO Interconnection Requests / Ongoing Efforts

Queue Pos.	Owner/Developer	Project Name	Date of IR	SP (MW)	WP (MW)	Type/ Fuel	Location County/State	Z	Interconnection Point	Utility	Availability of Studies	FS Complete/ SGIA Tender	Proposed In-Service	Proposed COD
363	Anbaric Development Partners, LLC	Poseidon Offshore	4/27/11	500	500	W	NY - Suffolk, NY	K	Ruland Rd. 138kV	LIPA	FES, SRIS, FS	2/2/2017	2020/07	2021/01
401	Caithness Long Island II, LLC	Caithness Long Island II	3/22/13	599	632	CC-D	Suffolk, NY	K	Sills Road Substation 138kV	LIPA	SRIS		2022/04	2023/05
467	Shoreham Solar Commons LLC	Shoreham Solar	12/22/14	25	25	S	Suffolk, NY	K	Ridge - Wildwood 69kV	LIPA	SRIS, FS	7/9/2019		VS
477	Riverhead Solar Farm LLC	Riverhead Solar	2/18/15	20	20	S	Suffolk, NY	K	Edwards Substation 138kV	LIPA	FES, SIS, FS	3/16/2018		VS
487	LI Energy Storage System, LLC	Far Rockaway Battery Storage	3/9/15	20	20	ES	Nassau, NY	K	Far Rockaway Substation 69kV	LIPA	FES, SIS		2021/10	2021/12
535	sPower Development Company, LLC	Riverhead Expansion	2/23/16	36	36	S	Suffolk, NY	K	Edwards Substation 138kV	LIPA	FES, SRIS		2020/11	2020/12
612	Deepwater Wind South Fork, LLC	South Fork Wind Farm	2/14/17	96	96	W	Suffolk, NY	K	East Hampton 69kV	LIPA	SRIS		2022/08	2022/12
649	CR Fuel Cell, LLC	Clare Rose	8/3/17	13.9	13.9	FC	Suffolk, NY	K	William Floyd Substation 69kV	LIPA	FES		2020/12	2020/12
650	BRT Fuel Cell, LLC	Brookhaven Rail Terminal	8/3/17	18.5	18.5	FC	Suffolk, NY	K	W. Yaphank - Yaphank 69kV	LIPA	FES		2019/10	2019/10
678	LI Solar Generation, LLC	Calverton Solar Energy Center	10/26/17	22.9	22.9	S	Suffolk, NY	K	Edwards Substation 138kV	LIPA	SRIS		2020/10	2020/12
680	Anbaric Development Partners, LLC	Long Island Offshore Wind	11/7/17	700	700	W	Suffolk, NY	K	Ruland Rd. 138kV	LIPA	None		2025/07	2025/12
695	Deepwater Wind, LLC	South Fork Wind Farm II	2/16/18	40	40	W	Suffolk, NY	K	East Hampton 69kV	LIPA	SRIS		2022/08	2022/12
702	Anbaric Development Partners, LLC	Long Island Offshore AC	3/15/18	800	800	W	Suffolk, NY	K	Ruland Rd. 138kV	LIPA	None		2025/07	2025/12
738	Equinor Wind US LLC	Empire Wind II	6/12/18	816	816	W	Suffolk, NY	K	Ruland Rd. Substation 138kV	LIPA	SRIS		2023/06	2024/12
746	Energy Storage Resources, LLC	Peconic River Energy Storage	7/30/18	150	150	ES	Suffolk, NY	K	Brookhaven - Sills 138kV	LIPA	SRIS		2022/03	2022/04

Reference: NYISO Interconnection Queue 10/11/2019

<https://www.nyiso.com > documents > NYISO-Interconnection-Queue.xlsx>

NYISO Interconnection Requests / Ongoing Efforts

Queue Pos.	Owner/Developer	Project Name	Date of IR	SP (MW)	WP (MW)	Type/ Fuel	Location County/State	Z	Interconnection Point	Utility	Availability of Studies	FS Complete/ SGIA Tender	Proposed In-Service	Proposed COD
751	Calpine Mid Atlantic Development, LL	Stony Brook Storage	8/14/18	50	50	ES	Suffolk, NY	K	8MR Substation 69kV	LIPA	None		2021/01	2021/06
754	Anbaric Development Partners, LLC	New York Ocean Grid - Canal	8/20/18	800	800	W	Suffolk, NY	K	Canal Substation 138kV	LIPA	None		2025/07	2025/12
755	Anbaric Development Partners, LLC	New York Ocean Grid - Shoreham	8/20/18	800	800	W	Suffolk, NY	K	Shoreham Substation 138kV	LIPA	None		2025/07	2025/12
762	Invenergy Storage Development LLC	Riverhead Storage Energy Center	9/17/18	75	75	ES	Suffolk, NY	K	Calverton - Riverhead 69kV	LIPA	None		2021/10	2021/12
764	Bay State Wind LLC	NYWind Canal	9/28/18	440	440	W	Suffolk, NY	K	Canal Substation 138kV	LIPA	None		2023/01	2024/01
765	Bay State Wind LLC	NYWind Brookhaven	9/28/18	880	880	W	Suffolk, NY	K	Brookhaven 138kV	LIPA	None		2023/01	2024/01
766	Bay State Wind LLC	NYWind Holbrook	9/28/18	880	880	W	Suffolk, NY	K	Holbrook 138kV	LIPA	None		2023/01	2024/01
788	Atlantic Shores Offshore Wind Project	Atlantic Shores Offshore Wind 7	1/14/19	880	880	W	Nassau, NY	K	East Garden City 345kV Substation	LIPA	None		2025/06	2025/12
792	Anbaric Development Partners, LLC	Long Island Offshore Wind Connection	1/29/19	300	300	W	Suffolk, NY	K	Ruland Road 138kV Substation	LIPA	None		2025/07	2025/12
816	LIPA	NNC TTC Increase	4/5/18	N/A	N/A	L	Suffolk, NY	K	Northport Substation 138kV	LIPA	None		2023	N/A
823	Wildwood Energy Storage, LLC	Wildwood Energy Storage	4/15/19	116.7	116.7	ES	Suffolk, NY	K	Wildwood Substation 138kV	LIPA	None		2022/09	2022/12
824	Wildwood Energy Storage, LLC	Wildwood Shoreham Energy Storage	4/15/19	76.9	76.9	ES	Suffolk, NY	K	Shoreham Substation 69kV	LIPA	None		2022/10	2022/12
825	Setauket Energy Storage, LLC	Setauket Energy Storage	4/15/19	76.9	76.9	ES	Suffolk, NY	K	Port Jefferson - Terryville 69kV	LIPA	None		2021/10	2021/12
892	FourGen LLC	Holtsville Fuel Cell	7/15/19	20	20	NG	Suffolk, NY	K	Holtsville 69kV	LIPA	None		2020/06	2020/06
893	FourGen LLC	Setauket Fuel Cell	7/15/19	20	20	NG	Suffolk, NY	K	Terryville Substation 8kV	LIPA	None		2020/06	2020/06

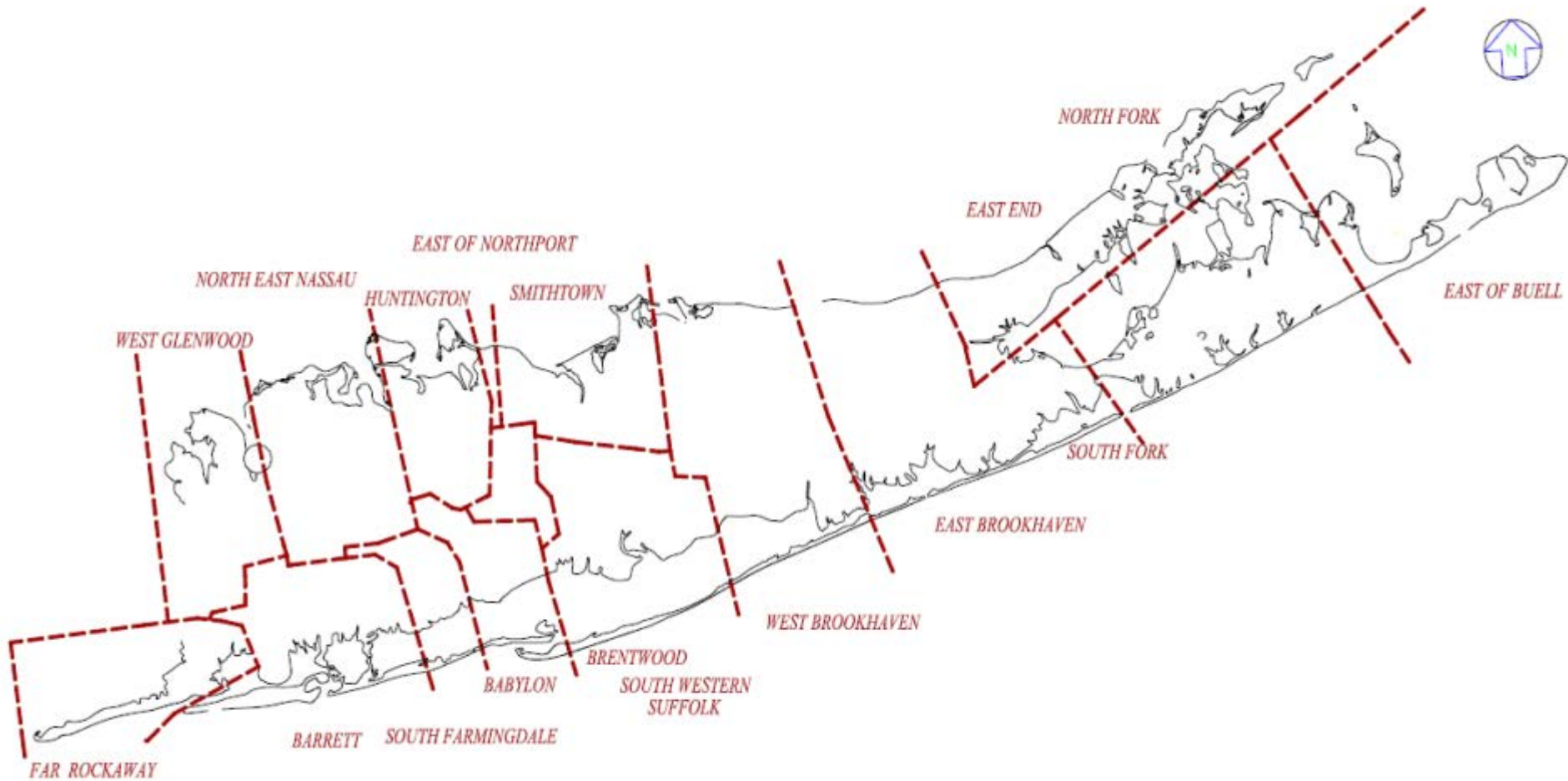
Reference: NYISO Interconnection Queue 10/11/2019

<https://www.nyiso.com > documents > NYISO-Interconnection-Queue.xlsx>

PSEG-LI Definition of a “Firm” Project

- In general, for a project to be considered “Firm” it must meet the following criteria:
 - Full budget approval through internal review
 - Preconstruction external outreach completed, stakeholder feedback obtained and addressed (if necessary)
 - Project Management has a defined scheduled start and completion date that is within the current or next year’s cycle
 - Operating Committee approved System Impact Study (SIS) if applicable
 - For projects subject to Article VII, have a determination from NYPSC that Article VII application is in compliance
- Any project that does not meet the above criteria will be considered “Non-Firm”

Long Island Load Pockets



Projects Being Considered

- *The following slides summarize projects that are currently under consideration as part of the ongoing planning process. These projects are continually being reviewed and considered as non-firm at this time. Therefore, the need, timing of, and/or the actual project recommendation may be under review.*

Summary of Projects – 100kV & above

Firm Projects - 100 kV and Above

138 kV Kings Highway Substation

Proposed In-Service Date

12/01/2020

Non-Firm Projects - 100 kV and Above

138 kV East Garden City to Valley Stream New Circuit

12/01/2020

Wildwood to Riverhead 69 kV to 138 kV Conversion

06/01/2021

138 kV Riverhead to Canal New Circuit

06/01/2021

138 kV Southampton to Deerfield New Circuit

06/01/2025

138 kV Syosset to Shore Road New Circuit

06/01/2026

Projects Being Considered (cont.)

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
Far Rockaway	33 kV Arverne to Rockaway Beach Reconductor	Reconductor the 33 kV Arverne to Far Rockaway circuit to increase the thermal rating of the circuit	Non-Firm	N/A	N/A	6/1/2022
	33 kV Far Rockaway Series Reactor	Install a 2-ohm Series Reactor on the 33 kV Far Rockaway to Rockaway Beach circuit to mitigate thermal constraints on the circuit.	Non-Firm	N/A	N/A	6/1/2022
	33 kV Arverne to Rockaway Beach new Circuit	Install a new 33 kV circuit between the Arverne substation to the Rockaway Beach substation.	Non-Firm	N/A	N/A	6/1/2025
Barrett	33kV Double Bus Tie Reconfiguration	33 kV reconfiguration of a double bus tie breaker to divert post contingency power flow and eliminate thermal overloads.	Non-Firm	N/A	N/A	12/1/2019
	138 kV East Garden City to Valley Stream New Circuit	Install a new 138 kV Circuit from the East Garden City substation to the Valley Stream substation.	Non-Firm	N/A	Certified	6/1/2020
	69kV New Massapequa Substation	Construct a new 69kV substation. 69kV supply will come from tapping the existing 69kV line from Massapequa to Sterling	Non-Firm	N/A	N/A	6/1/2023

Projects Being Considered (cont.)

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
West Glenwood	69 kV Whiteside Series Reactor	Install 2-Ohm Series Reactor on the 69 kV Whiteside to Stewart Manor circuit to mitigate thermal constraints on the circuit.	Non-Firm	N/A	N/A	12/1/2019
	69 kV Hempstead Substation	Upgrade the existing Hempstead substation from 23/4 kV to 69/13 kV. 69 kV supply will come from tapping the existing East Garden City to West Hempstead circuit	Firm	N/A	N/A	2019/2020
	33 kV Belmont Substation	Construct a new 33 kV substation. 33 kV supply will come from tapping the existing Floral Park to Elmont circuit.	Firm	N/A	N/A	6/1/2020
	69 kV Lindbergh Substation	Construct a new 69 kV substation. 69 kV supply will come from tapping the existing East Garden City to Meadowbrook Hospital circuit.	Firm	N/A	N/A	2020/2022

Projects Being Considered (cont.)

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
Northeast Nassau	69 kV Ruland to Plainview New Circuit	Install a new 69 kV circuit from the Ruland Rd. substation to the Plainview substation.	Non-Firm	N/A	N/A	6/1/2022
	69 kV Round Swamp Substation	Construct a new 69 kV substation. 69 kV supply will come from tapping the new Ruland Rd. to Plainview circuit (previous item)	Non-Firm	N/A	N/A	6/1/2022
	138 kV Syosset to Shore Road New Circuit	Install a new 138 kV circuit from the Syosset substation to the Ruland Road substation.	Non-Firm	Under Review	Not Filed	6/1/2026
South Farmingdale	69 kV Berry St. to South Farmingdale Reconductoring	Reconductor the 69 kV Berry St. to South Farmingdale circuit to increase the thermal rating of the circuit.	Non-Firm	N/A	N/A	6/1/2024
Brentwood	69 kV Deer Park Cap Bank	Install a 27 MVAR capacitor bank at the 69 kV Deer Park substation.	Firm	N/A	N/A	12/1/2019
	69 kV Pilgrim Bus Reconfiguration	Reconfigure connections to 69kV Buses at Pilgrim substation in order to divert post contingency power flow and eliminate thermal overloads.	Non-Firm	N/A	N/A	12/1/2023

Projects Being Considered (cont.)

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
Southwest Suffolk	69 kV MacArthur Cap Bank	Install a 27 MVAR capacitor bank at the MacArthur substation.	Firm	N/A	N/A	12/1/2019
	138 kV Kings Highway Substation	Construct a new 138 kV substation. 138 kV supply will come from tapping the existing Pilgrim to West Bus circuit.	Firm	N/A	N/A	2019/2020
	23 kV Fire Island Pines to Ocean Beach New Circuit	Install a new 23 kV circuit from the Fire Island Pines substation to the Ocean Beach substation.	Non-Firm	N/A	N/A	6/1/2023
West Brookhaven	69kV North Patchogue Substation	Construct a new 69kV substation. 69kV supply will come from tapping the existing 69kV lines in the area once property is identified.	Non-Firm	N/A	N/A	6/1/2024
East Brookhaven	Wildwood to Riverhead 69 kV to 138 kV Conversion	Convert the existing Wildwood to Riverhead circuit from 69 kV to 138 kV.	Non-Firm	Under Review	Certified	6/1/2021
	69 kV Moriches Series Reactor	Install a 2-ohm Series Reactor on the 69 kV South Manor - Moriches circuit to mitigate thermal constraints on the circuit.	Non-Firm	N/A	N/A	6/1/2023

Projects Being Considered (cont.)

Load Pocket	Project	Summary of Changes	Firm Status	SIS	Article VII	Proposed In-Service Date
East End	23 kV Navy Road Substation	Construct a new 23 kV substation. 23 kV supply will come from tapping the existing Amagansett - Montauk circuit.	Firm	N/A	N/A	6/1/2020
	138 kV Riverhead to Canal New Circuit	Install a new 138 kV circuit from the Riverhead substation to the Canal substation	Non-Firm	Under Review	Not Filed	6/1/2021
	East of Buell 23 kV to 33 kV Conversion	Convert the Hero, East Hampton, Buell, Amagansett, Hither Hills, Navy Road, and Culloden Point substation from 23 kV to 33 kV	Non-Firm	N/A	N/A	6/1/2023
	69 kV Bridgehampton to Buell New Circuit	Install a new 69 kV circuit from the Bridgehampton substation to the Buell substation.	Non-Firm	N/A	N/A	6/1/2023
	69kV Canal to Deerfield Double Circuit Reconfiguration	Reconfigure Canal to Southampton to Deerfield overhead circuits so that two overhead circuits run from Canal to Deerfield.	Non-Firm	N/A	N/A	6/1/2024
	138 kV Southampton to Deerfield New Circuit	Install a new 138 kV circuit from the Southampton substation to the Deerfield substation.	Non-Firm	Under Review	Not Filed	6/1/2025

Questions?

Document Posted on PSEG Long Island Web site

<https://www.psegliny.com/aboutpseglongisland/legalandregulatory>

Questions?

Please send any comments you may have to

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