

***PJM Upgrade Request  
System Impact Study Report***

***For***

***PJM Upgrade Request Queue Position Z2-053***

***Bridgewater – South River***

**June 2015**

## Preface

The intent of this System Impact Study is to determine a plan, with cost and construction time estimate, for the Network Upgrades necessary to provide the Incremental Auction Revenue Rights (IARRs) associated with the Upgrade Request as provided by the New Service Customer pursuant to Section 7.8 of Schedule 1 of the Operating Agreement and Part VI of the PJM Tariff.

In some instances, a New Service Customer with an associated Upgrade Request may not be responsible for 100% of the identified Network Upgrade cost because other transmission network uses exist. An estimate of the sharing of the Network Upgrade costs will be provided.

## General

TransSource LLC, the New Service Customer, has requested the evaluation of the required Network Upgrades to support awarding to the New Service Customer IARRs, in the amount of 156.1 MW, having specified a source location of Bridgewater and the sink location as South River.

## Network Upgrades

This Upgrade Request was studied in conjunction with other Upgrade Requests in order to provide the least cost option for all requests. The study resulted in identifying the following required reinforcements in order to grant the IARRs associated with the Z2-053 project:

Constraint Name	kV	Contingency Name	Z2-053 Impacts
ATHENIA 230 KV ATH-CLIB_Z	230	Red Oak & Parlin Surrogate	1.5
ATHENIA 230 KV ATH-CLIK_Z	230	Red Oak & Parlin Surrogate	1.5
ATHENIA 230 KV ATH-SAD_I	230	Red Oak & Parlin Surrogate	1.6
ATLANTIC230 KV ATL-LAR_Z	230	Atlantic-New Prospect RD-Smithburg230kV	33.4
BRANCHBU230 KV BRA-REA_I	230	BRUNSWCK-DEANS 230 LINE	9.0
BRIDGEWA230 KV BRI-MID_I	230	BASE	89.1
BRIDGEWA230 KV BRI-MID_I	230	L230.Atlantic-Larrabee.R-1032	93.4
CEDARGRO230 KV CED-CLIB_I	230	Red Oak & Parlin Surrogate	1.5
CEDARGRO230 KV CED-CLIK_I	230	Red Oak & Parlin Surrogate	1.5
CEDARSUB230 KV CED-ROSY_Z	230	Red Oak & Parlin Surrogate	2.4
CEDARSUB230 KV CED-WILF_Z	230	Red Oak & Parlin Surrogate	2.3
DEANS 230 KV DEA-PIES_I	230	BASE	2.1
DEANS 230 KV DEA-PIES_I	230	L230.Branchburg-Readington.M-2265	3.2
ESSEX 230 KV ESS-HUD_I	230	Red Oak & Parlin Surrogate	1.0
GREENBRO230 KV GRE-MID_Z	230	BASE	1.3
KILMER 230 KV KIL-LAKI_Z	230	L230.Atlantic-Larrabee.R-1032	93.5
KILMER 230 KV KIL-SAYI_I	230	L230.Atlantic-Larrabee.R-1032	93.5
LAKENELS230 KV LAK-MID_Z	230	L230.Atlantic-Larrabee.R-1032	93.5
MAYWOOD 230 KV MAY-SAD_Z	230	Red Oak & Parlin Surrogate	1.6
METUCHEN230 KV MET-PIE_Z	230	BASE	2.1
METUCHEN230 KV MET-PIE_Z	230	L230.Branchburg-Readington.M-2265	3.2

Constraint Name	kV	Contingency Name	Z2-053 Impacts
READINGT230 KV REA-ROS_I	230	BASE	7.9
READINGT230 KV REA-ROS_I	230	BRUNSWCK-DEANS 230 LINE	9.0
ROSELAND230 KV ROS-WILS_I	230	Red Oak & Parlin Surrogate	2.3

## Required Reinforcements

Item	TO	NUN	Upgrade Description	Estimated Time (Months)	Cost
1	PSE&G	n4450	Reconductor Athenia - Clifton B 230kV line	36	\$ 814,811
2	PSE&G	n4451	Reconductor Athenia - Clifton K 230kV line	36	\$ 824,562
3	PSE&G	n4452	New circuit Athenia - Saddle Brook 230kV line	36	\$ 93,600,000
4	JCPL	n4453	Larrabee sub - replace 230kV disconnect switch	7	\$ 125,000
5	JCPL	n4458	At Readington replace 230kV bus tie breaker, affiliated CT's, and disconnects	7	\$ 405,000
6	PSE&G	n4459	Reconductor Cedar Grove - Clifton B 230kV line	36	\$ 5,601,383
7	PSE&G	n4460	Reconductor Cedar Grove - Clifton K 230kV line	36	\$ 5,577,434
8	PSE&G	n4461	Reconductor Cedar Grove - Roseland 230kV line	36	\$ 13,243,604
9	PSE&G	n4462	Reconductor Cedar Grove - Williams 230kV line	36	\$ 13,757,566
10	PSE&G	n4463	Reconductor Deans - Pierson Ave 230kV line	36	\$ 27,246,458
11	PSE&G	n4466	Reconductor Maywood - Saddlebrook 230kV line	36	\$ 16,666,500
12	PSE&G	n4467	Reconductor Metuchen - Pierson 230kV line	36	\$ 989,389
13	JCPL – PSE&G	n4469	Replace Readington - Roseland 230kV line	36	\$ 142,712,324
14	PSE&G	n4471	Reconductor Roseland - Williams 230kV line	36	\$ 566,241
15	PSE&G	n4526	Reconductor Bridgewater - Middlesex 230kV line	36	\$ 12,976,041
16	PSE&G	n4527	Reconductor Essex - Hudson 230kV line	36	\$ 12,116,581
17	JCPL	n4528	Reconductor Green Brock - Middlesex 230kV line	36	\$ 6,300,000
18	JCPL	n4529	Reconductor Kilmer - Lake Nelson 230kV line	36	\$ 4,800,000
19	JCPL	n4530	Reconductor Kilmer - Raritan River 230kv line	36	\$ 15,300,000
20	JCPL	n4531	Reconductor Lake Nelson - Middlesex 230kV line	36	\$ 2,900,000
<b>Total Estimated Cost</b>					<b>\$ 376,522,894</b>

Note: The customer will be responsible for a tax gross up charge for each of these upgrades. This value will be confirmed in the Facilities Study phase.

## Final ICTRs Granted:

ICTRs were calculated using the 2018 RPM case. Pursuant to Section 234 of the PJM Tariff, New Service Customer shall have Incremental Capacity Transfer Rights in the following quantities into the indicated Locational Deliverability Area:

	PS	PS NORTH	JCPL
Z2-053:	220	251	0

New Service Customer's rights as described above shall become effective upon the completion of the Network Upgrades, Local Upgrades, or Merchant Network Upgrades identified in the above table

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**March 2015**

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ATLANTIC230 KV ATL-LAR_Z	Atlantic-New Prospect RD-Smithburg 230 kV line	33.4
BRANCHBU230 KV BRA-REA_I	BRUNSWCK-DEANS 230 LINE	9.0
BRIDGEWA230 KV BRI-MID_I	BASE	89.1
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CEDARSUB230 KV CED-ROSY_Z	Red Oak & Parlin Surrogate	2.4
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DEANS 230 KV DEA-PIES_I	L230.Branchburg-Readington.M-2265	3.2
ESSEX 230 KV ESS-HUD_I	Red Oak & Parlin Surrogate	1.0
GREENBRO230 KV GRE-MID_Z	BASE	1.3
KILMER 230 KV KIL-LAKI_Z	L230.Atlantic-Larrabee.R-1032	93.5
KILMER 230 KV KIL-SAYI_I	L230.Atlantic-Larrabee.R-1032	93.5
LAKENELS230 KV LAK-MID_Z	L230.Atlantic-Larrabee.R-1032	93.5

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METUCHEN230 KV MET-PIE_Z	BASE	2.1
METUCHEN230 KV MET-PIE_Z	L230.Branchburg-Readington.M-2265	3.2
READINGT230 KV REA-ROS_I	BASE	7.9
READINGT230 KV REA-ROS_I	BRUNSWCK-DEANS 230 LINE	9.0
ROSELAND230 KV ROS-WILS_I	Red Oak & Parlin Surrogate	2.3

## Required Reinforcements

Item	TO	NUN	Proposed Mitigation	Cost
1	PSE&G	n4450	Upgrade the Athenia – Clifton 230 kV line (B-2228) by 1.5 MVA	\$ 814,811
2	PSE&G	n4451	Upgrade the Athenia – Clifton 230 kV line (K-2263) by 1.5 MVA	\$ 824,562
3	PSE&G	n4452	Upgrade the Athenia – Saddlebrook 230 kV line by 1.6 MVA	\$ 93,600,000
4	JCPL	n4453	Larrabee Substation – Replace the 230 kV disconnect switch on the Atlantic terminal	\$ 125,000
5	JCPL	n4458	Readington Substation – Replace 230 kV bus tie breaker, affiliated CT's and disconnects. This constraint includes a rating external to FE of 996/1145 that is not included in this estimate.	\$ 405,000
6	PSE&G	n4459	Upgrade the Cedar Grove – Clifton 230 kV line (B-2228) by 1.5 MVA	\$ 5,601,383
7	PSE&G	n4460	Upgrade the Cedar Grove – Clifton 230 kV line (K-2263) by 1.5 MVA	\$ 5,577,434
8	PSE&G	n4461	Upgrade the Cedar Grove – Roseland 230 kV line (Y-2277) by 2.4 MVA	\$ 13,243,604
9	PSE&G	n4462	Upgrade the Cedar Grove – Williams 230 kV line (F-2206) by 2.3 MVA	\$ 13,757,566
10	PSE&G	n4463	Upgrade the Deans – Pierson 230 kV line by 3.2 MVA	\$ 27,246,458
11	PSE&G	n4466	Upgrade the Maywood – Saddlebrook 230 kV line by 1.6 MVA	\$ 16,666,500
12	PSE&G	n4467	Upgrade the Metuchen – Pierson 230 kV line by 3.2 MVA	\$ 989,389
13	JCPL – PSE&G	n4469	Upgrade the Readington – Roseland 230 kV line by 9 MVA	\$ 126,475,793
14	PSE&G	n4471	Upgrade the Roseland – Williams 230 kV line by 2.3 MVA	\$ 566,421
<b>Total Estimated Cost</b>				<b>\$ 305,893,921</b>

Note: The customer will be responsible for a tax gross up charge for each of these upgrades. This value will be confirmed in the Facilities Study phase.

All upgrades require a minimum of 36 months for construction with the exception of the Athenia – Saddlebrook and Readington – Roseland upgrades which require 60 months following the execution of a UCSA by all parties.

Some elements will be refined at the Facilities Study and if this results in any changes, a revised System Impact Study will be provided.