

***System Impact Study Report***

***for***

***PJM Upgrade Request Z2-072***

***“Indian River-New Church”  
(Revised)***

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, an Upgrade 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 Upgrade Customer, has requested the evaluation of the required Network Upgrades to support awarding to the Upgrade Customer IARRs, in the amount of 204.6 MW, having specified a source location of Indian River 26 kV Unit 4 and the sink location as New Church 13 kV CT1.

## 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 requested IARRs associated with the Z2-072 project:

Constraint Name	Contingency Name	MW Impact	Reinforcement	Cost Estimate	Time Estimate	NUN
COSTEN 138 KV COS-KIN_Z	BASE	83.9	Rebuild line, replace substation disconnect switches and bus	\$19,430,000	42 months	N4412
COSTEN 138 KV COS-KIN_Z	L138.NewChurch-PineyGrove.13764	169.8	Rebuild line, replace substation disconnect switches and bus	Addressed above	42 months	N4412
COSTEN 138 KV COS-POC_I	BASE	83.9	Rebuild line, replace 138kV breaker, disc. Switch, and substation bus	\$8,495,000	36 months	N4413
COSTEN 138 KV COS-POC_I	L138.NewChurch-PineyGrove.13764	169.8	Rebuild line, replace 138kV breaker, disc. Switch, and substation bus	Addressed above	36 months	N4413
DUPSEAFD69 KV DUP-LAU_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	18.1	Rebuild line, replace substation breakers, disc. Switches, and relays	\$5,532,024	30 months	N4414
EDGEWDPL69 KV EDG-NEL_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	36.3	Rebuild line, replace line relays	\$3,244,000	24 months	N4415
EDGEWDPL69 KV EDG-NSA_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	36.3	Rebuild line, replace substation breaker & bus	\$5,176,500	30 months	N4416
FRUITLAN69 KV FRT-PEM_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	26.4	Rebuild line, replace substation stranded bus, rigid bus, and disconnect switches	\$5,373,000	36 months	N4417
HEBRON 69 KV HEB-MAR_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	14.8	Rebuild line, replace disconnect switches	\$2,447,000	24 months	N4418
HEBRON 69 KV HEB-ROC_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	14.8	Rebuild line, replace disconnect switches and substation bus	\$2,880,000	24 months	N4419
INDIANR1138 KV IND-NEL_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	60.3	Rebuild line, replace substation bus	\$24,708,500	48 months	N4420
INDIANR1230 KV IND-PIN_I	BASE	116.6	Rebuild line	\$115,965,000	48 months	N4421

INDIANR1230 KV IND-PIN_I	L138.Loretto-Vienna.13780	153.0	Rebuild line	Addressed above	48 months	N4421
KENNEY 69 KV KEN-MTO_Z	BASE	16.2	Replace conductor, replace substation disc. switches and bus	\$5,670,500	48 months	N4422
KENNEY 69 KV KEN-MTO_Z	L138.NewChurch- PineyGrove.13764	34.8	Replace conductor, replace substation disc. switches and bus	Addressed above	48 months	N4422
KENNEY 69 KV KEN-STO_I	L138.NewChurch- PineyGrove.13764	34.8	Replace conductor, replace substation disc. Switches, bus, and breakers	\$10,868,979	48 months	N4423
KINGSCRK138 KV KIN-LOR_Z	BASE	83.9	Rebuild line, replace disc. Switches	\$21,300,000	48 months	N4424
KINGSCRK138 KV KIN-LOR_Z	L138.NewChurch- PineyGrove.13764	169.8	Rebuild line, replace disc. Switches	Addressed above	48 months	N4424
LAURELDP69 KV LAU-SHO_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	21.3	Rebuild line, replace substation breaker, disc. Switches, and bus	\$4,289,478	30 months	N4425
LORETTO 138 KV LOR-PIN_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	56.9	Rebuild line, replace substation disc. Switch	\$11,041,500	42 months	N4426
LORETTO 138 KV LOR-PIN_Z	L138.NewChurch- PineyGrove.13764	81.1	Rebuild line, replace substation disc. Switch	\$11,041,500	42 months	N4532
LORETTO 138 KV LOR-VIE_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	128.7	Rebuild line, replace substation disc. Switches, bus, and relays	\$56,830,000	48 months	N4427
MARDELA 69 KV MAR-VIE_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	14.8	Rebuild Line	\$7,740,000	36 months	N4428
MTHERMON69 KV MTH-NSA_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	49.5	Rebuild line, replace substation disc. Switches and bus	\$5,786,500	36 months	N4429
MTHERMON69 KV MTH-PIN_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	49.5	Rebuild line, replace substation disc. Switches, bus, and relays	\$7,723,000	36 months	N4430
MTOLIVE 69 KV MTO-PIN_Z	L138.NewChurch- PineyGrove.13764	34.8	Replace conductor, replace substation disc. Switches & bus	\$5,670,500	36 months	N4431
NEWCHURC138 KV NEW-OAK_Z	L138.NewChurch- PineyGrove.13764	99.1	Rebuild line, replace substation disc. Switch and bus	\$4,715,000	42 months	N4432
NEWCHURC138 KV NEW- OAK3_Z	L138.NewChurch- PineyGrove.13764	105.5	Rebuild line, replace substation disc. Switch and bus	\$5,102,500	42 months	N4433
NEWCHURC138 KV NEW-PIN_Z	BASE	104.5	Rebuild line & substation bus	\$26,157,974	48 months	N4434
NEWCHURC138 KV NEW-PIN_Z	L138.KingsCreek- Loretto.13713	176.0	Rebuild line & substation bus	Addressed above	48 months	N4434
NEWHOPE 69 KV NEW-OCN_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line & replace disconnect switches	\$6,484,000	24 months	N4435
NEWHOPE 69 KV NEW-WAL_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line, replace disconnect switches	\$13,211,000	36 months	N4436
NSALISBU69 KV NSA-PEM_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	26.4	Rebuild line, replace substation stranded bus, rigid bus, and disconnect switches	\$5,769,000	36 months	N4437
NSALISBU69 KV NSA-ROCK_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	14.8	Rebuild line, replace disconnect switches, circuit breakers, and substation bus	\$4,590,000	24 months	N4438
NSALISBU69 KV NSA-WAL_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line, replace substation stranded bus, rigid bus, disc. Switches, and circuit breakers	\$8,725,000	36 months	N4439
OAKHALL 138 KV OAK-POC_Z	BASE	83.9	Rebuild line, replace substation breakers, disc. Switches, and bus	\$36,807,500	48 months	N4440
OAKHALL 138 KV OAK-POC_Z	L138.NewChurch- PineyGrove.13764	169.8	Rebuild line, replace substation breakers, disc. Switches, and bus	Addressed above	48 months	N4440
OCEANPIN69 KV OCN-WOR_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line, replace substation stranded bus and disconnect switches	\$2,736,000	24 months	N4441
PINEYGRO230 KV AT20_I	BASE	116.6	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	\$8,250,000	36 months	N4442
PINEYGRO230 KV AT20_I	L138.Loretto-Vienna.13780	153.0	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	Addressed above	36 months	N4442
STEELE 230 KV	230/138.PineyGrove.AT20+L	78.1	Rebuild line	\$114,744,875	48 months	N4443

STE-VIE_I	230.PinyGrve-IndinR.23002					
VIENNA 230 KV AT20_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	78.1	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	\$8,250,000	36 months	N4444
VIENNA 230 KV AT20_I	BASE	34.2	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	Addressed above	36 months	N4444
<b>Total Estimated Cost</b>				<b>\$586,755,830</b>		

NUN: PJM Network Upgrade Number

### **Delmarva Network Upgrade Cost Estimates**

Cost estimates will further be refined as a part of the Facilities Study for this project. TransSource LLC will be responsible for all costs incurred by Delmarva in connection with the Z2-072 project. Such costs may include, but are not limited to, any transmission system assets currently in Delmarva's rate base that are prematurely retired due to the Z2-072 project. PJM shall work with Delmarva to identify these retirement costs and any additional expenses.

Delmarva reserves the right to reassess issues presented in this document and, upon appropriate justification, submit additional costs related to the Z2-072 project.

It is expected that the Upgrade Customer will be responsible for a tax gross up charge for each of these upgrades. This value will be confirmed during the Facilities Study phase.

### **Incremental Capacity Transfer Rights (ICTRs)**

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:

**29 MWs** into the DPL South Locational Deliverability Area (LDA).

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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NEWHOPE 69 KV NEW-OCN_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line & replace disconnect switches	\$5,050,672	24 months	N4435
NEWHOPE 69 KV NEW-WAL_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line, replace disconnect switches	\$10,258,968	36 months	N4436
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OAKHALL 138 KV OAK-POC_Z	BASE	83.9	Rebuild line, replace substation breakers, disc. Switches, and bus	\$36,807,500	48 months	N4440
OAKHALL 138 KV OAK-POC_Z	L138.NewChurch-PineyGrove.13764	169.8	Rebuild line, replace substation breakers, disc. Switches, and bus	Addressed above	48 months	N4440
OCEANPIN69 KV OCN-WOR_Z	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	24.8	Rebuild line, replace substation stranded bus and disconnect switches	\$2,150,998	24 months	N4441
PINEYGRO230 KV AT20_I	BASE	116.6	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	\$8,250,000	36 months	N4442
PINEYGRO230 KV AT20_I	L138.Loretto-Vienna.13780	153.0	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	Addressed above	36 months	N4442
STEELE 230 KV STE-VIE_I	230/138.PineyGrove.AT20+L 230.PinyGrve-IndinR.23002	78.1	Rebuild line	\$114,744,875	48 months	N4443
VIENNA 230 KV	230/138.PineyGrove.AT20+L	78.1	Add 2nd autotransformer,	\$8,250,000	36 months	N4444

AT20_I	230.PinyGrve-IndinR.23002		terminal position including breakers, bus, disc. Switches, and relays			
VIENNA 230 KV AT20_I	BASE	34.2	Add 2nd autotransformer, terminal position including breakers, bus, disc. Switches, and relays	Addressed above	36 months	N4444

NUN: PJM Network Upgrade Number

Note: It is expected that the Upgrade Customer will be responsible for a tax gross up charge for each of these upgrades. This value will be confirmed during the Facilities Study phase.