

## ***Generation Interconnection Feasibility Study Report Queue Position Z2-083***

The Interconnection Customer (IC) has proposed a 74 MWE (74 MWC) upgrade to their prior queue projects Q90, W4-015, and W4-016 located in Gloucester County, New Jersey. The requested upgrade MWs will be attained without the need for additional generating equipment. The generating facility will have a combined output of 1270 MW Maximum Facility Output (MFO) and 1200 MW Capacity (MWC). The natural gas fueled generating facility will be arranged in a 2X1 and 1X1 combined cycle configuration.

PJM studied Z2-083 as a 74 MW injection into the Atlantic City Electric system at the Mickleton 230 kV substation and evaluated it for compliance with reliability criteria for summer peak conditions in 2018. The proposed in-service date for the 74 MW uprate is June 1, 2017.

### **Point of Interconnection**

Z2-083 will utilize the same Point of Interconnection as prior queue projects Q90, W4-015 and W4-016 at the Atlantic City Electric Company's Mickleton 230 kV substation.

### **Direct Connection Requirements**

#### **Transmission Owner Scope of Direct Connection Work**

It is assumed that any necessary Transmission Owner scope of work will have been completed by prior queue project W4-016.

#### **Interconnection Customer Scope of Direct Connection Work**

The Interconnection Customer (IC) is responsible for all design and construction related to activities on their side of the Point of Interconnection. Site preparation, including grading and an access road, as necessary, is assumed to be by the IC. Route selection, line design, and right-of-way acquisition of the direct connect facilities is not included in this report, and is the responsibility of the IC. The Interconnection Customer will be responsible for contributing to future O & M costs associated with the direct connect facilities.

Protective relaying and metering design and installation must comply with PHI's applicable standards. The IC is also required to provide revenue metering and real-time telemetering data to PJM in conformance with the requirements contained in PJM Manuals M-01 and M-14 and the PJM Tariff. PHI will require the capability to remotely trip the generator from its System Operations facility. The interconnected customer will grant its permission for PJM to send PHI all telemetry that the Interconnection Customer sends to PJM. In addition, a direct data line will be required to send PHI the telemetry data. The Interconnection Customer will be required to make provisions for a voice quality phone line within approximately 3 feet of each PHI metering position to facilitate remote interrogation and data collection.

## **Transmission Network Impacts**

Potential transmission network impacts are as follows:

### **Generator Deliverability**

*(Single or N-1 contingencies for the **Capacity** portion only of the interconnection).* .

None

### **Multiple Facility Contingency**

*(Double Circuit Tower Line, Line with Failed Breaker and, Bus Fault contingencies for the **Full** energy output.*

None

### **Contribution to Previously Identified Overloads**

*(This project contributes to the following contingency overloads, i.e. “Network Impacts”, identified for earlier generation or transmission interconnection projects in the PJM Queue.)*

1. (PSEG - PSEG) The GLOUCSTR\_2-CAMDEN 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 120.65% to 123.46% (DC power flow) of its normal rating (490 MVA) for non-contingency condition. This project contributes approximately 13.77 MW to the thermal violation.

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

2. (PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 139.62% to 142.74% (DC power flow) of its normal rating (550 MVA) for non-contingency condition. This project contributes approximately 17.19 MW to the thermal violation.

Please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.

3. (PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 171.16% to 175.06% (DC power flow) of its emergency rating (750 MVA) for the single line contingency outage of 'L\_Y-2304'. This project contributes approximately 29.21 MW to the thermal violation.

CONTINGENCY 'L\_Y-2304'

TRIP LINE FROM BUS 219110 TO BUS 219125 CKT 1

GLOUCESTER

END

/\* CAMDEN TO GLOUCESTER

/\* CAMDEN TO

Please refer to Appendix 3 for a table containing the generators having contribution to this flowgate.

4. (PSEG - PSEG) The GLOUCSTR\_2-CAMDEN 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 176.45% to 180.49% (DC power flow) of its emergency rating (700 MVA) for the single line contingency outage of 'L\_D-2282\_LT'. This project contributes approximately 28.31 MW to the thermal violation.

```

CONTINGENCY 'L_D-2282_LT'                                /* CUTHBERT TO
GLOUCESTER
DISCONNECT BRANCH FROM BUS 219110 TO BUS 219128 CKT 2      /* REMOVE
26KV -2
CLOSE LINE FROM BUS 219177 TO BUS 219178 CKT 1             /* CUTHBERT
INCREASE BUS 219169 LOAD BY 2 MW                             /* TAKE ON LOAD AT CI
NN
INCREASE BUS 219170 LOAD BY 2 MW                             /* TAKE ON LOAD AT CI
NN
INCREASE BUS 219225 LOAD BY 2 MW                             /* TAKE ON LOAD AT CI
NN
INCREASE BUS 219226 LOAD BY 2 MW                             /* TAKE ON LOAD AT CI
NN
INCREASE BUS 219203 LOAD BY 4 MW                             /* TAKE ON LOAD AT
MAR LTON
INCREASE BUS 219204 LOAD BY 4 MW                             /* TAKE ON LOAD AT
MAR LTON
INCREASE BUS 219205 LOAD BY 4 MW                             /* TAKE ON LOAD AT
MAR LTON
INCREASE BUS 219206 LOAD BY 4 MW                             /* TAKE ON LOAD AT
MAR LTON
DECREASE BUS 219176 LOAD BY 6 MW                             /* PUSH OUT MVA
CUTH BERT
DECREASE BUS 219177 LOAD BY 6 MW                             /* PUSH OUT MVA
CUTH BERT
DECREASE BUS 219178 LOAD BY 6 MW                             /* PUSH OUT MVA
CUTH BERT
DECREASE BUS 219179 LOAD BY 6 MW                             /* PUSH OUT MVA
CUTH BERT
END

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Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

5. (PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 180.77% to 182.48% (DC power flow) of its emergency rating (750

MVA) for the line fault with failed breaker contingency outage of 'BF\_CAMD\_5-6\_LT'. This project contributes approximately 28.39 MW to the thermal violation.

```

CONTINGENCY 'BF_CAMD_5-6_LT'
TRIP LINE FROM BUS 219110 TO BUS 219125 CKT 1          /* CAMDEN TO
GLOUCESTER
DISCONNECT BUS 219129                                  /* REMOVE LEVITOWN BUS
CLOSE LINE FROM BUS 219196 TO BUS 219198 CKT 1          /* LEVITTOWN
CLOSE LINE FROM BUS 219195 TO BUS 219197 CKT 1          /* LEVITOWN
INCREASE BUS 219165 LOAD BY 16 MW                       /* TAKE ON LOAD AT
BUS LTN
INCREASE BUS 219166 LOAD BY 16 MW                       /* TAKE ON LOAD AT
BUS LTN
DECREASE BUS 219195 LOAD BY 8 MW                       /* PUSH OUT MVA LEV
ITN
DECREASE BUS 219196 LOAD BY 8 MW                       /* PUSH OUT MVA LEV
ITN
DECREASE BUS 219197 LOAD BY 8 MW                       /* PUSH OUT MVA LEV
ITN
DECREASE BUS 219198 LOAD BY 8 MW                       /* PUSH OUT MVA LEV
ITN
END

```

Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

6. (PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 180.98% to 182.74% (DC power flow) of its emergency rating (750 MVA) for the line fault with failed breaker contingency outage of 'BF\_GLOU\_1-4'. This project contributes approximately 29.34 MW to the thermal violation.

```

CONTINGENCY 'BF_GLOU_1-4'
DISCONNECT BRANCH FROM BUS 219110 TO BUS 219185 CKT 1    /* 69KV -6
GLOUCESTER
DISCONNECT BUS 219237                                    /* GLOUCESTER 230 CAPCITOR
TRIP LINE FROM BUS 219110 TO BUS 219125 CKT 1          /* CAMDEN TO
GLOUCESTER
END

```

Please refer to Appendix 6 for a table containing the generators having contribution to this flowgate.

7. (PSEG - PSEG) The GLOUCSTR\_2-CAMDEN 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 187.57% to 189.4% (DC power flow) of its emergency rating (700 MVA) for the line fault with failed breaker contingency outage of 'BF\_GLOU\_1-7'. This project contributes approximately 28.46 MW to the thermal violation.

CONTINGENCY 'BF\_GLOU\_1-7'  
 DISCONNECT BRANCH FROM BUS 219110 TO BUS 219185 CKT 1 /\* 69KV -6  
 GLOUCESTER  
 DISCONNECT BUS 219237 /\* GLOUCESTER 230 CAPCITOR  
 DISCONNECT BUS 219755 /\* BUS SECTION 4 CUTHBERT  
 DISCONNECT BRANCH FROM BUS 219110 TO BUS 219128 CKT 2 /\* REMOVE  
 26KV -2  
 CLOSE LINE FROM BUS 219177 TO BUS 219178 CKT 1 /\* CUTHBERT  
 END

Please refer to Appendix 7 for a table containing the generators having contribution to this flowgate.

### **Short Circuit**

No issues found.

### **Stability Analysis**

Will be performed during the System Impact Study phase of Z2-083.

### **Light Load Analysis**

Light Load Studies to during later study phases (as required by PJM be conducted Manual 14B).

### **New System Reinforcements**

*(Upgrades required to mitigate reliability criteria violations, i.e. "Network Impacts," initially caused by the addition of this project's generation)*

None

### **Contribution to Previously Identified System Reinforcements**

*(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.*

- 1 – 7. To mitigate the overloads in items 1 through 7 will require building a new Eagle Point – Penrose 230 kV circuit. The estimated cost to perform this work is **\$117 M** and will take **48 months** to complete.

## **Potential Congestion due to Local Energy Deliverability**

*(PJM also studied the delivery of the energy portion of the surrounding generation. Any potential problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with Network Upgrades to eliminate the operational restriction at their discretion by submitting a Transmission Interconnection Request. Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full deliverability for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which analyzes all overload conditions associated with the identified overloaded element(s). As a result of the aggregate energy resources in the area, the following violations were identified:*

These are **not** required reliability upgrades.

N/A

## **Appendices**

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gauge other generators impact.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

### **Appendix 1**

(PSEG - PSEG) The GLOUCSTR\_2-CAMDEN 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 120.65% to 123.46% (DC power flow) of its normal rating (490 MVA) for non-contingency condition. This project contributes approximately 13.77 MW to the thermal violation.

Bus Number	Bus Name	Full Contribution
228100	BLE DIES	0.67
228101	BLE#1 ST	9.61
219126	CAMDEN_CTG	1.31
219124	CAMDEN_STG	1.07
228301	D/W 1 ST	9.83
228302	D/W 6 ST	10.08
219120	EAGLEPT_2	2.54
219230	EAGLEPT_G1	0.32
219128	GLOUCSTR_26	0.59

228104	MID#3 CT	3.08
228105	MID1&2CT	3.33
219137	NAT PARK	5.51
295841	Q-090 2	7.5
291995	U4-036 C	0.03
292104	V1-030 C6	< 0.01
901001	W1-021 C	0.82
901011	W1-022 C	0.82
901021	W1-023 C	0.82
901271	W1-048 C	0.23
902091	W1-130 C	0.39
903141	W2-101 C	0.94
903963	W3-175	48.2
905131	W4-015 C	25.32
905143	W4-016	63.29
905271	W4-027 C	0.31
905391	W4-040 C	0.46
907031	X1-021 C	0.03
907221	X1-039	0.35
909091	X2-027 C	0.09
913341	Y1-077	6.11
914231	Y2-081 C OP1	0.02
914331	Y2-105	12.27
914361	Y2-110	3.35
915591	Y3-087 C OP1	0.33
917021	Z2-004	1.49
917381	Z2-062	0.79
917461	Z2-082	0.03
917471	Z2-083	13.77

## **Appendix 2**

(PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 139.62% to 142.74% (DC power flow) of its normal rating (550 MVA) for non-contingency condition. This project contributes approximately 17.19 MW to the thermal violation.

Bus Number	Bus Name	Full Contribution
228100	BLE DIES	0.84
228101	BLE#1 ST	11.99
219126	CAMDEN_CTG	1.64
219124	CAMDEN_STG	1.33
228301	D/W 1 ST	12.27
228302	D/W 6 ST	12.58
219120	EAGLEPT_2	3.17

219230	EAGLEPT_G1	0.4
219128	GLOUCSTR_26	0.74
228104	MID#3 CT	3.85
228105	MID1&2CT	4.15
219137	NAT PARK	6.87
295841	Q-090 2	9.35
291995	U4-036 C	0.03
292104	V1-030 C6	< 0.01
901001	W1-021 C	1.02
901011	W1-022 C	1.02
901021	W1-023 C	1.02
901271	W1-048 C	0.29
902091	W1-130 C	0.49
903141	W2-101 C	1.17
903963	W3-175	60.15
905131	W4-015 C	31.59
905143	W4-016	78.97
905271	W4-027 C	0.38
905391	W4-040 C	0.57
907031	X1-021 C	0.04
907221	X1-039	0.43
909091	X2-027 C	0.12
913341	Y1-077	7.62
914231	Y2-081 C OP1	0.03
914331	Y2-105	15.31
914361	Y2-110	4.18
915591	Y3-087 C OP1	0.41
917021	Z2-004	1.86
917381	Z2-062	0.98
917461	Z2-082	0.03
917471	Z2-083	17.19

### **Appendix 3**

(PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 171.16% to 175.06% (DC power flow) of its emergency rating (750 MVA) for the single line contingency outage of 'L\_Y-2304'. This project contributes approximately 29.21 MW to the thermal violation.

CONTINGENCY 'L\_Y-2304' /\* CAMDEN TO GLOUCESTER  
TRIP LINE FROM BUS 219110 TO BUS 219125 CKT 1 /\* CAMDEN TO  
GLOUCESTER  
END

Bus Number	Bus Name	Full Contribution
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228100	BLE DIES	1.42
228101	BLE#1 ST	20.38
219126	CAMDEN_CTG	2.78
219124	CAMDEN_STG	2.26
228301	D/W 1 ST	20.84
228302	D/W 6 ST	21.38
219120	EAGLEPT_2	5.39
219230	EAGLEPT_G1	0.67
219128	GLOUCSTR_26	1.25
228104	MID#3 CT	6.54
228105	MID1&2CT	7.05
219137	NAT PARK	11.68
295841	Q-090 2	15.9
291995	U4-036 C	0.05
292104	V1-030 C6	0.02
901001	W1-021 C	1.74
901011	W1-022 C	1.74
901021	W1-023 C	1.74
901271	W1-048 C	0.5
902091	W1-130 C	0.83
903141	W2-101 C	1.99
903963	W3-175	102.21
905131	W4-015 C	53.68
905143	W4-016	134.19
905271	W4-027 C	0.65
905391	W4-040 C	0.98
907031	X1-021 C	0.06
907221	X1-039	0.74
909091	X2-027 C	0.2
913341	Y1-077	12.95
914231	Y2-081 C OP1	0.05
914331	Y2-105	26.01
914361	Y2-110	7.09
915591	Y3-087 C OP1	0.7
917021	Z2-004	3.16
917381	Z2-062	1.67
917461	Z2-082	0.05
917471	Z2-083	29.21

## **Appendix 4**

(PSEG - PSEG) The GLOUCSTR\_2-CAMDEN 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 176.45% to 180.49% (DC power flow) of its emergency rating (700 MVA) for the single line contingency outage of 'L\_D-2282\_LT'. This project contributes approximately 28.31 MW to the thermal violation.

CONTINGENCY 'L\_D-2282\_LT' /\* CUTHBERT TO  
 GLOUCESTER  
 DISCONNECT BUS 219755 /\* BUS SECTION 4 CUTHBERT  
 DISCONNECT BRANCH FROM BUS 219110 TO BUS 219128 CKT 2 /\*  
 REMOVE 26KV -2  
 CLOSE LINE FROM BUS 219177 TO BUS 219178 CKT 1 /\* CUTHBERT  
 INCREASE BUS 219169 LOAD BY 2 MW /\* TAKE ON LOAD AT  
 CI NN  
 INCREASE BUS 219170 LOAD BY 2 MW /\* TAKE ON LOAD AT  
 CI NN  
 INCREASE BUS 219225 LOAD BY 2 MW /\* TAKE ON LOAD AT  
 CI NN  
 INCREASE BUS 219226 LOAD BY 2 MW /\* TAKE ON LOAD AT  
 CI NN  
 INCREASE BUS 219203 LOAD BY 4 MW /\* TAKE ON LOAD AT  
 MAR LTON  
 INCREASE BUS 219204 LOAD BY 4 MW /\* TAKE ON LOAD AT  
 MAR LTON  
 INCREASE BUS 219205 LOAD BY 4 MW /\* TAKE ON LOAD AT  
 MAR LTON  
 INCREASE BUS 219206 LOAD BY 4 MW /\* TAKE ON LOAD AT  
 MAR LTON  
 DECREASE BUS 219176 LOAD BY 6 MW /\* PUSH OUT MVA  
 CUTH BERT  
 DECREASE BUS 219177 LOAD BY 6 MW /\* PUSH OUT MVA  
 CUTH BERT  
 DECREASE BUS 219178 LOAD BY 6 MW /\* PUSH OUT MVA  
 CUTH BERT  
 DECREASE BUS 219179 LOAD BY 6 MW /\* PUSH OUT MVA  
 CUTH BERT  
 END

Bus Number	Bus Name	Full Contribution
228100	BLE DIES	1.38
228101	BLE#1 ST	19.76
219126	CAMDEN_CTG	2.69
219124	CAMDEN_STG	2.19
228301	D/W 1 ST	20.21
228302	D/W 6 ST	20.72
219120	EAGLEPT_2	5.22
219230	EAGLEPT_G1	0.65
219128	GLOUCSTR_26	1.21
228104	MID#3 CT	6.34
228105	MID1&2CT	6.84
219137	NAT PARK	11.32

295841	Q-090 2	15.41
291995	U4-036 C	0.05
292104	V1-030 C6	0.02
901001	W1-021 C	1.69
901011	W1-022 C	1.69
901021	W1-023 C	1.69
901271	W1-048 C	0.48
902091	W1-130 C	0.8
903141	W2-101 C	1.93
903963	W3-175	99.08
905131	W4-015 C	52.03
905143	W4-016	130.08
905271	W4-027 C	0.63
905391	W4-040 C	0.95
907031	X1-021 C	0.06
907221	X1-039	0.72
909091	X2-027 C	0.19
913341	Y1-077	12.55
914231	Y2-081 C OP1	0.05
914331	Y2-105	25.22
914361	Y2-110	6.88
915591	Y3-087 C OP1	0.68
917021	Z2-004	3.06
917381	Z2-062	1.62
917461	Z2-082	0.05
917471	Z2-083	28.31

## **Appendix 5**

(PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 180.77% to 182.48% (DC power flow) of its emergency rating (750 MVA) for the line fault with failed breaker contingency outage of 'BF\_CAMD\_5-6\_LT'. This project contributes approximately 28.39 MW to the thermal violation.

CONTINGENCY 'BF\_CAMD\_5-6\_LT'

TRIP LINE FROM BUS 219110 TO BUS 219125 CKT 1 /\* CAMDEN TO  
GLOUCESTER

DISCONNECT BUS 219129 /\* REMOVE LEVITOWN BUS

CLOSE LINE FROM BUS 219196 TO BUS 219198 CKT 1 /\* LEVITOWN

CLOSE LINE FROM BUS 219195 TO BUS 219197 CKT 1 /\* LEVITOWN

INCREASE BUS 219165 LOAD BY 16 MW /\* TAKE ON LOAD AT  
BUS LTN

INCREASE BUS 219166 LOAD BY 16 MW /\* TAKE ON LOAD AT  
BUS LTN

```

DECREASE BUS 219195 LOAD BY 8 MW          /* PUSH OUT MVA LEV
ITN
DECREASE BUS 219196 LOAD BY 8 MW          /* PUSH OUT MVA LEV
ITN
DECREASE BUS 219197 LOAD BY 8 MW          /* PUSH OUT MVA LEV
ITN
DECREASE BUS 219198 LOAD BY 8 MW          /* PUSH OUT MVA LEV
ITN
END

```

Bus Number	Bus Name	Full Contribution
228100	BLE DIES	1.48
228101	BLE#1 ST	21.3
219126	CAMDEN_CTG	2.67
219124	CAMDEN_STG	2.18
228301	D/W 1 ST	20.78
228302	D/W 6 ST	21.32
219128	GLOUCSTR_26	1.2
228104	MID#3 CT	6.79
228105	MID1&2CT	7.32
227807	MO AV B	3.53
219137	NAT PARK	11.22
227801	ONTC&DCT	7.06
213641	PELTZ	-0.18
292815	U1-056 C	8.22
292816	U1-056 E	55.04
292966	U2-045 C	0.46
292967	U2-045 E	3.07
291996	U4-036 E	1.42
292063	V1-021 E	0.06
292194	V1-030 CE	0.07
292105	V1-030 E6	0.41
292195	V1-030 EE	1.86
297083	V2-035 E	0.31
297090	V2-041 E	0.5
297104	V2-046 E	3.41
904222	V4-023 E1	2.77
904224	V4-023 E2	0.31
904232	V4-024 E1	1.64
904234	V4-024 E2	1.62
904242	V4-025 E1	1.95
904244	V4-025 E2	0.97
904246	V4-025 E3	0.24
904248	V4-025 E4	0.37
904402	V4-041 E	2.98

904412	V4-042 E1	1.49
904414	V4-042 E2	1.67
904532	V4-054 E	2.88
901001	W1-021 C	1.76
901002	W1-021 E	2.88
901011	W1-022 C	1.76
901012	W1-022 E	2.88
901021	W1-023 C	1.76
901022	W1-023 E	2.88
901271	W1-048 C	0.5
901272	W1-048 E	0.81
902091	W1-130 C	0.85
902092	W1-130 E	1.38
902432	W2-030 E	1.08
903141	W2-101 C	1.99
903142	W2-101 E	3.24
903521	W3-033	1.33
903963	W3-175	101.45
905131	W4-015 C	52.18
905132	W4-015 E	28.39
905143	W4-016	130.45
905271	W4-027 C	0.67
905272	W4-027 E	1.09
905391	W4-040 C	0.99
905392	W4-040 E	1.62
905531	W4-063 C	0.11
905532	W4-063 E	0.77
905512	W4-085 E	0.15
905522	W4-089 E	0.43
905562	W4-090 E	0.43
907032	X1-021 E	1.52
907211	X1-074	0.1
907472	X1-110 E	0.38
909032	X2-013 E	0.89
909091	X2-027 C	0.2
909092	X2-027 E	0.32
910862	X3-075 E	1.6
910902	X3-081 E	-0.03
912032	X4-004 E	2.67
913242	Y1-057 E	0.15
913341	Y1-077	13.53
914331	Y2-105	25.05
914361	Y2-110	7.41
915002	Y3-012 E	1.32
915591	Y3-087 C OP1	0.67

915592	Y3-087 E OP1	1.16
916292	Z1-082 E	0.23
917021	Z2-004	3.14
917381	Z2-062	1.6
917461	Z2-082	0.06
917471	Z2-083	28.39

## **Appendix 6**

(PSEG - PSEG) The GLOUCSTR\_2-CUTHBERT\_4 230 kV line (from bus 219110 to bus 219755 ckt 2) loads from 180.98% to 182.74% (DC power flow) of its emergency rating (750 MVA) for the line fault with failed breaker contingency outage of 'BF\_GLOU\_1-4'. This project contributes approximately 29.34 MW to the thermal violation.

CONTINGENCY 'BF\_GLOU\_1-4'

DISCONNECT BRANCH FROM BUS 219110 TO BUS 219185 CKT 1 /\* 69KV -6  
GLOUCESTER  
DISCONNECT BUS 219237 /\* GLOUCESTER 230 CAPCITOR  
TRIP LINE FROM BUS 219110 TO BUS 219125 CKT 1 /\* CAMDEN TO  
GLOUCESTER  
END

Bus Number	Bus Name	Full Contribution
228100	BLE DIES	1.42
228101	BLE#1 ST	20.46
219126	CAMDEN_CTG	2.79
219124	CAMDEN_STG	2.27
228301	D/W 1 ST	20.93
228302	D/W 6 ST	21.47
219128	GLOUCSTR_26	1.26
228104	MID#3 CT	6.57
228105	MID1&2CT	7.08
219137	NAT PARK	11.73
213641	PELTZ	-0.15
291996	U4-036 E	1.47
292063	V1-021 E	0.05
292194	V1-030 CE	0.07
292105	V1-030 E6	0.43
292195	V1-030 EE	1.94
297083	V2-035 E	0.31
297090	V2-041 E	0.49
297104	V2-046 E	3.42
904222	V4-023 E1	2.76
904224	V4-023 E2	0.32
904232	V4-024 E1	1.65

904234	V4-024 E2	1.63
904242	V4-025 E1	1.99
904244	V4-025 E2	0.97
904246	V4-025 E3	0.23
904248	V4-025 E4	0.37
904402	V4-041 E	2.9
904412	V4-042 E1	1.46
904414	V4-042 E2	1.65
904532	V4-054 E	2.85
901001	W1-021 C	1.75
901002	W1-021 E	2.85
901011	W1-022 C	1.75
901012	W1-022 E	2.85
901021	W1-023 C	1.75
901022	W1-023 E	2.85
901271	W1-048 C	0.5
901272	W1-048 E	0.81
902091	W1-130 C	0.83
902092	W1-130 E	1.35
903141	W2-101 C	2.
903142	W2-101 E	3.26
903963	W3-175	102.66
905131	W4-015 C	53.92
905132	W4-015 E	29.34
905143	W4-016	134.8
905271	W4-027 C	0.65
905272	W4-027 E	1.07
905391	W4-040 C	0.98
905392	W4-040 E	1.6
905512	W4-085 E	0.14
905522	W4-089 E	0.42
905562	W4-090 E	0.42
907032	X1-021 E	1.58
907211	X1-074	0.03
907472	X1-110 E	0.37
909032	X2-013 E	0.92
909091	X2-027 C	0.2
909092	X2-027 E	0.33
910862	X3-075 E	1.68
910902	X3-081 E	-0.03
912032	X4-004 E	2.79
913242	Y1-057 E	0.13
913341	Y1-077	13.
914331	Y2-105	26.13
914361	Y2-110	7.12

915591	Y3-087 C OP1	0.7
915592	Y3-087 E OP1	1.2
916292	Z1-082 E	0.06
917021	Z2-004	3.17
917381	Z2-062	1.68
917461	Z2-082	0.05
917471	Z2-083	29.34

## **Appendix 7**

(PSEG - PSEG) The GLOUCSTR\_2-CAMDEN 230 kV line (from bus 219110 to bus 219125 ckt 1) loads from 187.57% to 189.4% (DC power flow) of its emergency rating (700 MVA) for the line fault with failed breaker contingency outage of 'BF\_GLOU\_1-7'. This project contributes approximately 28.46 MW to the thermal violation.

CONTINGENCY 'BF\_GLOU\_1-7'

DISCONNECT BRANCH FROM BUS 219110 TO BUS 219185 CKT 1 /\* 69KV -6  
GLOUCESTER

DISCONNECT BUS 219237 /\* GLOUCESTER 230 CAPCITOR

DISCONNECT BUS 219755 /\* BUS SECTION 4 CUTHBERT

DISCONNECT BRANCH FROM BUS 219110 TO BUS 219128 CKT 2 /\*

REMOVE 26KV -2

CLOSE LINE FROM BUS 219177 TO BUS 219178 CKT 1 /\* CUTHBERT

END

Bus Number	Bus Name	Full Contribution
228100	BLE DIES	1.38
228101	BLE#1 ST	19.85
219126	CAMDEN_CTG	2.71
219124	CAMDEN_STG	2.21
228301	D/W 1 ST	20.31
228302	D/W 6 ST	20.83
219128	GLOUCSTR_26	1.22
228104	MID#3 CT	6.37
228105	MID1&2CT	6.87
219137	NAT PARK	11.38
213641	PELTZ	-0.15
291996	U4-036 E	1.43
292063	V1-021 E	0.05
292194	V1-030 CE	0.07
292105	V1-030 E6	0.42
292195	V1-030 EE	1.88
297083	V2-035 E	0.3
297090	V2-041 E	0.48
297104	V2-046 E	3.32



904222	V4-023 E1	2.67
904224	V4-023 E2	0.31
904232	V4-024 E1	1.6
904234	V4-024 E2	1.58
904242	V4-025 E1	1.93
904244	V4-025 E2	0.94
904246	V4-025 E3	0.23
904248	V4-025 E4	0.36
904402	V4-041 E	2.81
904412	V4-042 E1	1.41
904414	V4-042 E2	1.6
904532	V4-054 E	2.76
901001	W1-021 C	1.69
901002	W1-021 E	2.76
901011	W1-022 C	1.69
901012	W1-022 E	2.76
901021	W1-023 C	1.69
901022	W1-023 E	2.76
901271	W1-048 C	0.48
901272	W1-048 E	0.79
902091	W1-130 C	0.81
902092	W1-130 E	1.31
903141	W2-101 C	1.94
903142	W2-101 E	3.16
903963	W3-175	99.6
905131	W4-015 C	52.31
905132	W4-015 E	28.46
905143	W4-016	130.78
905271	W4-027 C	0.63
905272	W4-027 E	1.04
905391	W4-040 C	0.95
905392	W4-040 E	1.55
905512	W4-085 E	0.13
905522	W4-089 E	0.4
905562	W4-090 E	0.41
907032	X1-021 E	1.53
907211	X1-074	0.03
907472	X1-110 E	0.36
909032	X2-013 E	0.89
909091	X2-027 C	0.19
909092	X2-027 E	0.32
910862	X3-075 E	1.63
910902	X3-081 E	-0.03
912032	X4-004 E	2.71
913242	Y1-057 E	0.13

913341	Y1-077	12.61
914331	Y2-105	25.35
914361	Y2-110	6.91
915591	Y3-087 C OP1	0.68
915592	Y3-087 E OP1	1.16
916292	Z1-082 E	0.06
917021	Z2-004	3.08
917381	Z2-062	1.63
917461	Z2-082	0.05
917471	Z2-083	28.46