#Y1-026 - Tosco 230 kV
Generation Interconnection

Network Impacts

The Queue Project #Y1-026 was studied as a 160.0MW (Capacity160.0MW) injection at the Tosco 230 kV substation in the PSEG area. Project #Y1-026 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

Generator Deliverability

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

1. The DEANS-BRUNSWK8 230 kV line (from bus 218306 to bus 218342 ckt 1) loads from 98.5% to 100.31% (**DC power flow**) of its emergency rating (740 MVA) for the single line contingency ('PJM10A'). This project contributes approximately 13.41 MW to the thermal violation.

```
CONTINGENCY 'PJM10A'
 DISCONNECT BRANCH FROM BUS 200002 TO BUS 218350 CKT 1          /* BRANCHBG BRANCHBG 500 230
 END
```

Multiple Facility Contingency

(Double Circuit Tower Line contingencies only with full energy output. Stuck Breaker and Bus Fault contingencies will be applied during the Impact Study)

No Problems Identified

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. The FANWOODO-ROSELAND 230 kV line (from bus 218320 to bus 216950 ckt 1) loads from 100.23% to 104.9% (**DC power flow**) of its emergency rating (870 MVA) for the single line contingency ('PS8B'). This project contributes approximately 40.6 MW to the thermal violation.

```
CONTINGENCY 'PS8B'
 DISCONNECT BRANCH FROM BUS 218441 TO BUS 218316 CKT 1          /* G22 WARINANCO 230 230
 MOVE 100 PERCENT LOAD FROM BUS 218410 TO BUS 218411           /* WARINANCO T1 T2
 END
```

2. The NEWDOVRO-FANWOODO 230 kV line (from bus 218355 to bus 218320 ckt 1) loads from 110.1% to 114.77% (**DC power flow**) of its emergency rating (870 MVA) for the single line contingency ('PS8B'). This project contributes approximately 40.6 MW to the thermal violation.

```
CONTINGENCY 'PS8B'
 DISCONNECT BRANCH FROM BUS 218441 TO BUS 218316 CKT 1        /* G22 WARINANCO 230 230
 MOVE 100 PERCENT LOAD FROM BUS 218410 TO BUS 218411          /* WARINANCO T1 T2
 END
```

3. The PRSN AVG-NEWDOVRO 230 kV line (from bus 218357 to bus 218355 ckt 1) loads from 114.9% to 119.56% (**DC power flow**) of its emergency rating (870 MVA) for the single line contingency ('PS8B'). This project contributes approximately 40.6 MW to the thermal violation.

```
CONTINGENCY 'PS8B'
 DISCONNECT BRANCH FROM BUS 218441 TO BUS 218316 CKT 1        /* G22 WARINANCO 230 230
 MOVE 100 PERCENT LOAD FROM BUS 218410 TO BUS 218411          /* WARINANCO T1 T2
 END
```

4. The TOSCO-G22_MTX5 230 kV line (from bus 218343 to bus 218441 ckt 1) loads from 118.1% to 125.63% (**DC power flow**) of its normal rating (950 MVA) for non-contingency condition. This project contributes approximately 71.58 MW to the thermal violation.

5. The TOSCO-G22_MTX5 230 kV line (from bus 218343 to bus 218441 ckt 1) loads from 124.48% to 130.94% (**DC power flow**) of its emergency rating (1150 MVA) for the tower line contingency ('36PS'). This project contributes approximately 74.33 MW to the thermal violation.

```
CONTINGENCY '36PS'                          /* DEANS-WESTFIELD 230KV & SEWAREN-ROSELAND 230KV DCTL
 TRIP LINE FROM BUS 218306 TO BUS 218356
 TRIP LINE FROM BUS 218356 TO BUS 218305
 TRIP LINE FROM BUS 218355 TO BUS 218357
 TRIP LINE FROM BUS 218355 TO BUS 218320
 TRIP LINE FROM BUS 218320 TO BUS 216950
 TRIP LINE FROM BUS 218311 TO BUS 218341
 MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218412          /* WOODBRIDGE T3 T2
 MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218414          /* WOODBRIDGE T3 T1
```

```
MOVE 100 PERCENT LOAD FROM BUS 218415 TO BUS 218416          /* WESTFIELD T1 T2
MOVE 100 PERCENT LOAD FROM BUS 218380 TO BUS 218381          /* FANWOOD T2 T1
END
```

6. The STAN_TER-15THST 230 kV line (from bus 218430 to bus 217170 ckt 1) loads from 124.35% to 133.19% (**DC power flow**) of its emergency rating (550 MVA) for the single line contingency ('ALD_SPRI'). This project contributes approximately 48.59 MW to the thermal violation.

```
CONTINGENCY 'ALD_SPRI'                          /* ALDENE 230KV-SPRINGFLD RD 138KV
 TRIP LINE FROM BUS 218345 TO BUS 216911
 MOVE 100 PERCENT LOAD FROM BUS 216927 TO BUS 216926
 END
```

7. The ALDENE-STAN_TER 230 kV line (from bus 218307 to bus 218430 ckt 1) loads from 125.26% to 133.96% (**DC power flow**) of its emergency rating (558 MVA) for the single line contingency ('ALD_SPRI'). This project contributes approximately 48.59 MW to the thermal violation.

```
CONTINGENCY 'ALD_SPRI'                          /* ALDENE 230KV-SPRINGFLD RD 138KV
 TRIP LINE FROM BUS 218345 TO BUS 216911
 MOVE 100 PERCENT LOAD FROM BUS 216927 TO BUS 216926
 END
```

8. The 15THST-W.ORANGE 230 kV line (from bus 217170 to bus 216914 ckt 1) loads from 129.02% to 137.92% (**DC power flow**) of its emergency rating (550 MVA) for the single line contingency ('ALD_SPRI'). This project contributes approximately 48.96 MW to the thermal violation.

```
CONTINGENCY 'ALD_SPRI'                          /* ALDENE 230KV-SPRINGFLD RD 138KV
 TRIP LINE FROM BUS 218345 TO BUS 216911
 MOVE 100 PERCENT LOAD FROM BUS 216927 TO BUS 216926
 END
```

9. The WARINANC-ALDENE1 230 kV line (from bus 218316 to bus 217122 ckt 1) loads from 140.26% to 150.04% (**DC power flow**) of its normal rating (732 MVA) for non-contingency condition. This project contributes approximately 71.58 MW to the thermal violation.

10. The WARINANC-ALDENE1 230 kV line (from bus 218316 to bus 217122 ckt 1) loads from 160.55% to 169.45% (**DC power flow**) of its emergency rating (831 MVA) for the tower line contingency ('36PS'). This project contributes approximately 73.99 MW to the thermal violation.

```
CONTINGENCY '36PS'                                  /* DEANS-WESTFIELD 230KV & SEWAREN-ROSELAND 230KV DCTL
 TRIP LINE FROM BUS 218306 TO BUS 218356
 TRIP LINE FROM BUS 218356 TO BUS 218305
 TRIP LINE FROM BUS 218355 TO BUS 218357
 TRIP LINE FROM BUS 218355 TO BUS 218320
 TRIP LINE FROM BUS 218320 TO BUS 216950
 TRIP LINE FROM BUS 218311 TO BUS 218341
 MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218412      /* WOODBRIDGE T3 T2
 MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218414      /* WOODBRIDGE T3 T1
 MOVE 100 PERCENT LOAD FROM BUS 218415 TO BUS 218416     /* WESTFIELD T1 T2
 MOVE 100 PERCENT LOAD FROM BUS 218380 TO BUS 218381     /* FANWOOD T2 T1
 END
```

11. The G22_MTX5-WARINANC 230 kV line (from bus 218441 to bus 218316 ckt 1) loads from 166.71% to 177.67% (**DC power flow**) of its normal rating (653 MVA) for non-contingency condition. This project contributes approximately 71.58 MW to the thermal violation.

12. The SPRINGRD-W.ORANGE 230 kV line (from bus 216911 to bus 216914 ckt 1) loads from 176.85% to 190.67% (**DC power flow**) of its normal rating (249 MVA) for non-contingency condition. This project contributes approximately 34.42 MW to the thermal violation.

13. The G22_MTX5-WARINANC 230 kV line (from bus 218441 to bus 218316 ckt 1) loads from 185.64% to 195.48% (**DC power flow**) of its emergency rating (752 MVA) for the tower line contingency ('36PS'). This project contributes approximately 73.99 MW to the thermal violation.

```
CONTINGENCY '36PS'                                  /* DEANS-WESTFIELD 230KV & SEWAREN-ROSELAND 230KV DCTL
 TRIP LINE FROM BUS 218306 TO BUS 218356
 TRIP LINE FROM BUS 218356 TO BUS 218305
```

```
TRIP LINE FROM BUS 218355 TO BUS 218357
TRIP LINE FROM BUS 218355 TO BUS 218320
TRIP LINE FROM BUS 218320 TO BUS 216950
TRIP LINE FROM BUS 218311 TO BUS 218341
MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218412        /* WOODBRIDGE T3 T2
MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218414        /* WOODBRIDGE T3 T1
MOVE 100 PERCENT LOAD FROM BUS 218415 TO BUS 218416       /* WESTFIELD T1 T2
MOVE 100 PERCENT LOAD FROM BUS 218380 TO BUS 218381       /* FANWOOD T2 T1
END
```

14. The SPRINGRD-W.ORANGE 230 kV line (from bus 216911 to bus 216914 ckt 1) loads from 183.71% to 197.8% (**DC power flow**) of its emergency rating (374 MVA) for the single line contingency ('ALD_ESSEXA'). This project contributes approximately 52.71 MW to the thermal violation.

```
CONTINGENCY 'ALD_ESSEXA'                  /* ALDENE 230KV-ESSEX 230KV
TRIP LINE FROM BUS 218307 TO BUS 218430
TRIP LINE FROM BUS 218430 TO BUS 217170
END
```

15. The ALDENE2-SPRINGRD 230 kV line (from bus 218345 to bus 216911 ckt 1) loads from 223.32% to 238.03% (**DC power flow**) of its normal rating (234 MVA) for non-contingency condition. This project contributes approximately 34.42 MW to the thermal violation.

16. The ALDENE2-SPRINGRD 230 kV line (from bus 218345 to bus 216911 ckt 1) loads from 233.13% to 249.11% (**DC power flow**) of its emergency rating (330 MVA) for the single line contingency ('ALD_ESSEXA'). This project contributes approximately 52.71 MW to the thermal violation.

```
CONTINGENCY 'ALD_ESSEXA'                  /* ALDENE 230KV-ESSEX 230KV
TRIP LINE FROM BUS 218307 TO BUS 218430
TRIP LINE FROM BUS 218430 TO BUS 217170
END
```

Short Circuit

(Summary of impacted circuit breakers)

No circuit breakers identified.

New System Reinforcements

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

Item	Description	Time	Total Cost
1	Replace Wave Trap at Brunswick 230kV; New B = 831	6 months	$250,000
		Total	**$250,000**

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

Item	Description	Time	Total Cost
1	Fanwood – Roseland: Reconductor 850/1050	48 months	$27,975,000
2&3	Fanwood- N Dover-Pierson Ave: Reconductor w/ACSS NEW 850/1050	24 months	$13,815,000
4, 5, 9, 10, 11, 13.	Build Parallel circuit Linden-VFT-Aldene	48 months	$11,360,112
	Reconductor U-2273 w/ACSS NEW 850/1050 (VFT-Warn)	12 months	$2,925,000
	Reconductor N-2240 w/ACSS NEW 850/1050 (Warn-Aldene)	18 months	$4,620,000
6, 7, 8, 12, 14, 15, 16.	Build Aldene-West Orange 2nd Cable	48 months	$17,105,112
		Total	**$77,800,224**

Appendix I – Contingency Tables

Contingency Name	Description
PJM10A	CONTINGENCY 'PJM10A' DISCONNECT BRANCH FROM BUS 200002 TO BUS 218350 CKT 1 /* BRANCHBG BRANCHBG 500 230 END
PS8B	CONTINGENCY 'PS8B' DISCONNECT BRANCH FROM BUS 218441 TO BUS 218316 CKT 1 /* G22 WARINANCO 230 230 MOVE 100 PERCENT LOAD FROM BUS 218410 TO BUS 218411 /* WARINANCO T1 T2 END
36PS	CONTINGENCY '36PS' /* DEANS-WESTFIELD 230KV & SEWAREN-ROSELAND 230KV DCTL TRIP LINE FROM BUS 218306 TO BUS 218356 TRIP LINE FROM BUS 218356 TO BUS 218305 TRIP LINE FROM BUS 218355 TO BUS 218357 TRIP LINE FROM BUS 218355 TO BUS 218320 TRIP LINE FROM BUS 218320 TO BUS 216950 TRIP LINE FROM BUS 218311 TO BUS 218341 MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218412 /* WOODBRIDGE T3 T2 MOVE 50 PERCENT LOAD FROM BUS 218413 TO BUS 218414 /* WOODBRIDGE T3 T1 MOVE 100 PERCENT LOAD FROM BUS 218415 TO BUS 218416 /* WESTFIELD T1 T2 MOVE 100 PERCENT LOAD FROM BUS 218380 TO BUS 218381 /* FANWOOD T2 T1 END
ALD_SPRI	CONTINGENCY 'ALD_SPRI' /* ALDENE 230KV-SPRINGFLD RD 138KV TRIP LINE FROM BUS 218345 TO BUS 216911 MOVE 100 PERCENT LOAD FROM BUS 216927 TO BUS 216926 END
ALD_ESSEXA	CONTINGENCY 'ALD_ESSEXA' /* ALDENE 230KV-ESSEX 230KV TRIP LINE FROM BUS 218307 TO BUS 218430 TRIP LINE FROM BUS 218430 TO BUS 217170 END

Table 1 - Contingencies

Generator Deliverability										
Queue	Contingency		Facility Description	Bus		Loading %		Rating		MW Contr
Y1-026	Type	Name		From	To	Initial	Final	Type	MVA	
1	N-1	PJM10A	DEANS-BRUNSWK8 230 kV line	218306	218342	98.5	100.31	ER	740	13.41

Table 2 – Generator Deliverability

Contribution to Previously Identified Overloads										
Queue	Contingency		Facility Description	Bus		Loading %		Rating		MW Contr
Y1-026	Type	Name		From	To	Initial	Final	Type	MVA	
1	N-1	PS8B	FANWOODO-ROSELAND 230 kV line	218320	216950	100.23	104.9	ER	870	40.6
2	N-1	PS8B	NEWDOVRO-FANWOODO 230 kV line	218355	218320	110.1	114.77	ER	870	40.6
3	N-1	PS8B	PRSN AVG-NEWDOVRO 230 kV line	218357	218355	114.9	119.56	ER	870	40.6
4	Non	Non	TOSCO-G22_MTX5 230 kV line	218343	218441	118.1	125.63	NR	950	71.58
5	DCTL	36PS	TOSCO-G22_MTX5 230 kV line	218343	218441	124.48	130.94	ER	1150	74.33
6	N-1	ALD_SPRI	STAN_TER-15THST 230 kV line	218430	217170	124.35	133.19	ER	550	48.59
7	N-1	ALD_SPRI	ALDENE-STAN_TER 230 kV line	218307	218430	125.26	133.96	ER	558	48.59
8	N-1	ALD_SPRI	15THST-W.ORANGE 230 kV line	217170	216914	129.02	137.92	ER	550	48.96
9	Non	Non	WARINANC-ALDENE1 230 kV line	218316	217122	140.26	150.04	NR	732	71.58
10	DCTL	36PS	WARINANC-ALDENE1 230 kV line	218316	217122	160.55	169.45	ER	831	73.99
11	Non	Non	G22_MTX5-WARINANC 230 kV line	218441	218316	166.71	177.67	NR	653	71.58
12	Non	Non	SPRINGRD-W.ORANGE 230 kV line	216911	216914	176.85	190.67	NR	249	34.42
13	DCTL	36PS	G22_MTX5-WARINANC 230 kV line	218441	218316	185.64	195.48	ER	752	73.99
14	N-1	ALD_ESSEXA	SPRINGRD-W.ORANGE 230 kV line	216911	216914	183.71	197.8	ER	374	52.71
15	Non	Non	ALDENE2-SPRINGRD 230 kV line	218345	216911	223.32	238.03	NR	234	34.42
16	N-1	ALD_ESSEXA	ALDENE2-SPRINGRD 230 kV line	218345	216911	233.13	249.11	ER	330	52.71

Table 3 – Contribution to Previously Identified Overloads