



PROJECT ASSESSMENT CONCLUSIONS REPORT

DEVELOPMENT OF THE QUEENSLAND - NSW INTERCONNECTOR

November 2014

Appendix H – Schedule of Binding Constraints > Ten
Hours

	Constraint ID	Constraint Description	2016			2017			2018			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	0.5	0.0	-0.5	0.8	0.0	-0.8	1.1	0.0	-1.1	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	737.2	0.4	-736.9	907.9	0.2	-907.7	981.2	0.1	-981.1	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	17.7	0.0	-17.7	22.3	0.0	-22.3	12.7	0.0	-12.7	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	199.4	0.9	-198.5	311.4	1.2	-310.1	365.2	0.2	-365.0	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	128.7	0.0	-128.7	197.1	0.1	-197.1	245.3	0.1	-245.3	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	13.4	3.8	-9.7	21.0	4.8	-16.2	8.7	2.1	-6.6	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	656.0	406.3	-249.7	729.3	479.5	-249.8	902.3	607.5	-294.8	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	36.9	111.3	74.4	55.7	163.2	107.5	76.6	173.5	96.9	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	587.9	396.6	-191.3	660.0	537.6	-122.4	666.7	552.7	-113.9	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	47.6	129.5	81.9	76.2	225.9	149.7	78.7	257.8	179.1	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	81.7	80.0	-1.7	134.8	153.1	18.3	146.2	198.7	52.5	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	5.2	62.0	56.9	18.1	110.9	92.8	10.5	149.3	138.8	
	Total			2512.1	1190.7	-1321.5	3134.6	1676.5	-1458.1	3495.2	1942.0	-1553.2
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	1.8	0.0	-1.8	2.5	0.0	-2.5	2.9	0.0	-2.9
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	768.4	0.5	-767.9	934.5	0.2	-934.3	999.8	0.2	-999.6	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	9.5	0.0	-9.5	8.5	0.0	-8.5	7.3	0.0	-7.3	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	208.5	0.6	-207.9	312.0	1.2	-310.8	364.0	0.7	-363.3	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	84.8	0.1	-84.7	133.0	0.1	-132.9	161.1	0.1	-161.0	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	20.1	6.0	-14.0	31.5	9.2	-22.3	18.5	6.5	-12.0	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	0.2	0.0	-0.2	0.5	0.0	-0.5	1.4	0.0	-1.4	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	630.6	367.5	-263.1	770.4	497.9	-272.5	876.9	573.2	-303.7	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	42.9	100.5	57.6	61.6	160.6	99.0	58.5	166.7	108.3	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	568.0	381.0	-187.0	624.7	501.7	-123.0	627.4	518.0	-109.4	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	47.9	131.2	83.3	76.4	227.0	150.6	80.4	259.6	179.1	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	33.2	74.9	41.7	63.9	116.9	53.1	88.3	145.1	56.8	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	2.7	66.4	63.7	13.2	91.1	77.9	6.4	114.7	108.3	
Total			2418.4	1128.8	-1289.6	3032.8	1605.9	-1426.9	3292.9	1784.7	-1508.2	

	Constraint ID	Constraint Description	2019			2020			2021			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	7.6	0.0	-7.6	4.2	0.0	-4.2	4.7	0.0	-4.7	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1075.0	0.2	-1074.8	1382.3	0.4	-1381.9	1135.0	0.1	-1134.9	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	105.9	0.0	-105.9	47.1	0.0	-47.1	32.4	0.0	-32.4	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	503.4	1.8	-501.7	713.9	5.0	-708.9	650.7	3.9	-646.8	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	295.1	0.0	-295.0	331.7	0.1	-331.7	260.6	0.1	-260.5	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	10.0	1.8	-8.2	19.7	5.3	-14.4	27.2	8.4	-18.8	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	959.3	666.2	-293.1	1165.0	882.6	-282.4	949.9	659.5	-290.4	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	99.4	334.0	234.6	138.0	416.3	278.3	90.5	315.8	225.3	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	713.8	606.7	-107.1	731.1	629.8	-101.3	665.4	534.4	-131.1	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	104.5	346.1	241.6	114.8	401.3	286.5	99.5	326.4	226.9	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	97.7	184.0	86.3	113.1	249.1	136.0	85.9	227.0	141.2	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	7.3	232.1	224.8	9.1	303.9	294.9	7.4	233.8	226.4	
		Total		3979.0	2373.0	-1606.0	4770.0	2893.8	-1876.3	4009.1	2309.5	-1699.7
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	12.5	0.0	-12.5	7.8	0.0	-7.8	8.4	0.0	-8.4
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1172.9	0.4	-1172.5	1333.8	0.7	-1333.1	1028.0	0.3	-1027.8	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	55.5	0.0	-55.5	44.3	0.0	-44.3	31.7	0.0	-31.7	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	481.3	7.1	-474.3	718.4	7.4	-711.1	671.8	3.4	-668.4	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	237.1	0.0	-237.1	312.2	0.1	-312.1	254.7	0.1	-254.6	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	29.6	12.5	-17.0	58.2	26.4	-31.8	65.4	29.6	-35.8	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	1.0	0.0	-1.0	1.7	0.0	-1.7	2.9	0.0	-2.9	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	896.9	653.0	-243.9	1147.5	859.3	-288.2	933.3	640.7	-292.6	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	86.7	317.8	231.1	113.7	418.3	304.6	75.5	315.1	239.7	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	663.4	571.9	-91.5	683.5	593.0	-90.5	621.9	503.8	-118.0	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	106.5	347.7	241.1	114.3	398.3	284.0	97.0	325.8	228.8	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	66.1	142.5	76.4	118.5	233.4	114.9	76.0	204.3	128.4	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	6.4	209.7	203.3	8.7	276.5	267.8	7.2	212.8	205.7	
		Total		3815.9	2262.5	-1553.4	4662.6	2813.3	-1849.3	3873.7	2236.0	-1637.7

	Constraint ID	Constraint Description	2022			2023			2024			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	8.7	0.0	-8.7	13.0	0.0	-13.0	7.1	0.0	-7.1	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1052.7	0.2	-1052.4	1130.0	0.5	-1129.5	1282.4	0.3	-1282.1	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	40.5	0.0	-40.5	43.4	0.0	-43.4	60.9	0.0	-60.9	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	728.7	5.7	-723.0	816.0	8.8	-807.2	973.5	11.5	-962.0	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	301.0	0.1	-300.9	342.9	0.1	-342.8	392.2	0.1	-392.1	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	49.5	16.5	-33.0	53.2	18.8	-34.4	81.9	30.4	-51.5	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	961.7	711.6	-250.1	998.0	727.9	-270.1	1106.6	845.7	-260.9	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	106.2	333.6	227.4	119.9	358.6	238.7	141.4	404.8	263.4	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	657.2	524.6	-132.6	669.1	555.8	-113.3	633.5	545.0	-88.5	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	110.2	361.9	251.7	122.3	390.6	268.3	124.2	457.1	332.9	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	117.8	235.1	117.3	159.4	284.8	125.5	246.5	328.9	82.4	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	4.3	232.9	228.5	3.8	268.4	264.5	1.1	289.6	288.5	
	Total			4138.5	2422.2	-1716.3	4471.1	2614.3	-1856.7	5051.4	2913.4	-2138.0
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	13.6	0.0	-13.6	21.7	0.0	-21.7	13.9	0.4	-13.5
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1008.6	0.2	-1008.4	1025.9	0.3	-1025.6	1274.0	0.6	-1273.4	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	64.9	0.0	-64.9	76.4	0.0	-76.4	94.2	0.0	-94.2	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	735.3	5.4	-729.9	847.8	7.3	-840.6	949.8	9.9	-940.0	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	313.6	0.1	-313.5	367.3	0.1	-367.2	425.9	0.1	-425.8	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	62.5	26.6	-35.9	64.1	23.8	-40.3	83.0	33.2	-49.9	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	3.8	0.0	-3.8	5.0	0.0	-5.0	4.9	0.0	-4.9	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	892.2	641.8	-250.4	962.5	694.9	-267.7	1065.0	793.1	-271.9	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	70.3	314.6	244.3	80.8	346.7	265.9	94.0	399.7	305.7	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	613.7	489.2	-124.5	625.6	516.9	-108.8	599.3	520.8	-78.5	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	108.8	360.7	251.9	116.0	388.2	272.2	118.2	458.1	339.9	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	146.9	249.0	102.1	186.5	308.6	122.1	261.9	349.9	88.0	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	3.8	230.9	227.1	3.0	263.0	260.0	0.7	297.8	297.0	
Total			4037.8	2318.4	-1719.5	4382.7	2549.8	-1832.9	4984.9	2863.5	-2121.4	

	Constraint ID	Constraint Description	2025			2026			2027			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	19.2	0.0	-19.1	18.9	0.1	-18.8	12.0	0.0	-12.0	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1445.3	0.5	-1444.9	1273.2	0.1	-1273.1	1492.5	0.1	-1492.4	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	48.0	0.0	-48.0	32.3	0.0	-32.3	32.2	0.0	-32.2	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1115.3	46.2	-1069.1	1118.7	44.2	-1074.6	1176.5	69.6	-1106.9	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	416.8	0.0	-416.7	370.0	0.1	-370.0	358.5	0.1	-358.4	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	74.1	23.2	-51.0	70.8	23.1	-47.6	169.5	76.9	-92.6	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	1172.0	965.3	-206.7	1084.2	890.9	-193.2	1028.2	869.0	-159.2	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	158.8	527.2	368.4	140.6	456.0	315.4	110.2	476.4	366.3	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	635.6	558.9	-76.7	616.3	524.6	-91.8	599.7	508.7	-90.9	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	138.4	539.1	400.7	128.1	497.8	369.7	119.3	532.3	413.0	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	245.6	421.5	175.9	132.5	402.1	269.5	167.2	408.3	241.1	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	2.0	335.3	333.3	1.4	301.7	300.4	1.4	328.8	327.4	
	Total			5471.0	3417.1	-2053.8	4986.8	3140.6	-1846.2	5267.0	3270.2	-1996.8
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	26.3	0.0	-26.3	28.2	0.1	-28.1	17.2	0.0	-17.2
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1435.1	0.4	-1434.7	1318.1	0.1	-1318.0	1538.7	0.3	-1538.4	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	70.6	0.0	-70.6	34.9	0.0	-34.9	34.4	0.0	-34.4	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1061.7	43.5	-1018.2	1150.2	48.5	-1101.8	1159.5	77.1	-1082.4	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	470.7	0.1	-470.7	319.5	0.1	-319.5	346.5	0.1	-346.4	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	119.5	52.1	-67.4	99.9	39.5	-60.4	194.8	93.3	-101.5	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	4.0	0.0	-4.0	4.8	0.0	-4.8	4.0	0.0	-4.0	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	1141.7	945.3	-196.4	1056.5	865.8	-190.8	1023.8	850.2	-173.6	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	109.9	520.1	410.2	100.0	465.8	365.8	96.8	466.8	370.0	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	596.0	524.1	-71.9	582.0	498.1	-83.9	570.2	491.3	-78.9	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	136.3	539.8	403.5	123.2	506.9	383.8	117.0	542.8	425.9	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	291.0	444.2	153.1	133.8	392.8	259.0	181.0	417.5	236.5	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	1.8	341.2	339.3	1.0	296.6	295.6	1.4	339.5	338.1	
Total			5464.6	3410.7	-2053.9	4952.1	3114.2	-1837.9	5285.2	3278.8	-2006.4	

	Constraint ID	Constraint Description	2028			2029			2030			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	14.5	0.0	-14.5	10.0	0.0	-10.0	14.2	0.0	-14.2	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1349.4	0.0	-1349.4	1204.5	0.0	-1204.5	945.9	0.0	-945.9	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	26.6	0.0	-26.6	27.5	0.0	-27.5	14.4	0.0	-14.4	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1176.0	84.1	-1091.9	1109.1	52.9	-1056.2	950.7	48.4	-902.3	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	390.7	0.1	-390.7	358.2	0.1	-358.1	275.4	0.0	-275.4	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	164.7	77.2	-87.5	163.6	71.6	-92.0	224.5	96.6	-127.9	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	977.9	800.3	-177.7	859.6	671.8	-187.7	757.2	560.3	-196.9	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	118.6	455.1	336.5	111.3	395.5	284.3	61.0	300.9	240.0	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	554.8	461.0	-93.8	515.7	431.6	-84.1	449.2	349.2	-100.0	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	113.4	490.5	377.1	108.9	450.7	341.9	86.2	317.6	231.4	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	156.2	400.0	243.8	117.6	368.9	251.3	78.5	297.8	219.2	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	0.3	319.0	318.7	0.0	257.7	257.7	0.1	189.2	189.1	
	Total			5043.1	3087.3	-1955.8	4585.7	2700.8	-1884.9	3857.2	2159.9	-1697.3
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	22.5	0.0	-22.5	16.4	0.0	-16.4	20.3	0.0	-20.3
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1352.9	0.0	-1352.9	1237.5	0.0	-1237.5	1002.1	0.0	-1002.1	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	39.8	0.0	-39.8	32.5	0.0	-32.5	21.7	0.0	-21.7	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1147.4	57.2	-1090.2	1084.8	44.9	-1039.9	940.1	41.0	-899.1	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	391.1	0.1	-391.0	381.2	0.1	-381.1	323.1	0.0	-323.1	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	215.1	103.8	-111.3	163.4	71.0	-92.4	231.0	108.5	-122.5	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	5.0	0.0	-5.0	8.5	0.0	-8.5	9.5	0.0	-9.5	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	964.2	775.9	-188.4	847.5	650.5	-197.0	787.0	604.8	-182.2	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	74.2	459.4	385.2	56.9	385.3	328.5	50.3	318.2	267.9	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	529.3	451.2	-78.0	499.8	432.5	-67.3	440.8	361.7	-79.1	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	111.5	500.9	389.4	105.8	461.3	355.5	88.0	346.8	258.9	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	164.0	412.4	248.3	154.9	384.4	229.5	99.6	302.8	203.1	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	0.4	318.7	318.4	0.0	274.1	274.1	0.1	203.1	203.0	
Total			5017.3	3079.5	-1937.8	4589.0	2704.1	-1885.0	4013.6	2286.9	-1726.6	

	Constraint ID	Constraint Description	2031			2032			2033			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	18.2	0.0	-18.2	13.0	0.0	-13.0	14.7	0.0	-14.7	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	897.2	0.0	-897.2	885.8	0.0	-885.8	987.2	0.0	-987.2	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	17.8	0.0	-17.8	44.0	0.0	-44.0	44.3	0.0	-44.3	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1005.0	42.0	-963.0	981.0	35.3	-945.7	1195.0	40.9	-1154.1	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	268.4	0.0	-268.4	471.6	0.1	-471.5	472.0	0.1	-471.9	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	210.5	82.3	-128.3	225.7	86.8	-138.9	150.9	49.5	-101.4	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	800.4	629.6	-170.7	979.9	786.6	-193.3	1056.5	887.4	-169.1	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	63.0	349.0	286.0	75.8	427.8	352.0	82.5	509.0	426.5	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	456.1	372.8	-83.3	416.1	337.2	-78.9	458.5	386.9	-71.6	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	88.2	346.3	258.0	86.5	360.9	274.4	112.4	466.1	353.8	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	63.8	316.8	253.0	132.8	329.0	196.2	125.1	371.2	246.2	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	0.1	206.2	206.1	0.1	257.2	257.1	0.1	265.3	265.1	
	Total			3888.7	2344.9	-1543.8	4312.3	2620.9	-1691.5	4699.2	2976.4	-1722.7
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	24.6	0.0	-24.6	21.7	0.0	-21.7	25.7	0.0	-25.7
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	954.0	0.0	-954.0	995.8	0.0	-995.8	1065.8	0.0	-1065.8	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	19.0	0.0	-19.0	16.3	0.0	-16.3	23.5	0.0	-23.5	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1010.8	42.5	-968.4	1117.1	41.1	-1076.0	1290.8	43.0	-1247.8	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	296.4	0.0	-296.4	304.4	0.1	-304.3	365.6	0.1	-365.5	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	259.5	121.2	-138.3	278.2	131.8	-146.4	189.0	77.7	-111.3	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	9.6	0.0	-9.6	7.5	0.0	-7.5	11.3	0.0	-11.3	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	803.6	629.9	-173.7	991.2	792.7	-198.6	1083.6	905.0	-178.6	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	70.7	375.4	304.7	81.2	460.8	379.6	109.3	558.4	449.1	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	452.4	382.2	-70.2	421.7	347.4	-74.3	459.3	398.3	-61.0	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	90.2	383.3	293.1	90.1	395.6	305.6	113.8	489.9	376.1	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	79.1	322.5	243.4	72.4	327.3	254.9	86.2	353.9	267.8	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	0.1	216.1	216.1	0.1	225.8	225.7	0.3	247.5	247.3	
Total			4069.9	2473.1	-1596.9	4397.7	2722.5	-1675.2	4824.2	3073.8	-1750.4	

	Constraint ID	Constraint Description	2034			2035			
			Base Case	Option 2B	Difference	Base Case	Option 2B	Difference	
50% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	12.6	0.0	-12.6	7.5	0.0	-7.5	
	N::Q_NIL_KC	Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1059.3	0.0	-1059.3	1008.9	0.0	-1008.9	
	N:Q_NIL_LDTW	Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	26.3	0.0	-26.3	15.6	0.0	-15.6	
	N^^Q_NIL_B1	Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1233.0	77.5	-1155.6	1262.9	57.0	-1205.9	
	N^Q_NIL_B	Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	538.5	1.0	-537.6	531.8	0.1	-531.7	
	Q:N_NIL_BCK2L-G	Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	241.4	86.6	-154.7	205.8	66.4	-139.4	
	N>>Q_NIL_LDTW (Shoulder Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	1045.1	919.5	-125.5	1014.0	884.8	-129.2	
	N>>Q_NIL_LDTW (Shoulder Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	101.5	595.3	493.8	100.2	593.6	493.4	
	N>>Q_NIL_LDTW (Summer Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	437.3	374.5	-62.8	435.6	380.8	-54.8	
	N>>Q_NIL_LDTW (Summer Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	109.6	486.2	376.6	116.0	515.1	399.1	
	N>>Q_NIL_LDTW (Winter Day)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	170.8	385.6	214.8	218.3	369.4	151.1	
	N>>Q_NIL_LDTW (Winter Night)	Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	0.0	341.6	341.6	0.0	308.5	308.4	
	Total			4975.2	3267.7	-1707.5	4916.5	3175.7	-1740.8
	10% POE	N_NIL_TE_A	Out=Nil, Terranora Interconnector NSW to Qld flow limit	19.9	0.0	-19.9	17.5	0.0	-17.4
N::Q_NIL_KC		Out= Nil, NSW to Qld Transient Stability Limit for trip of Kogan Creek.	1138.4	0.0	-1138.4	1074.3	0.0	-1074.3	
N:Q_NIL_LDTW		Out = Nil, NSW to Qld Transient Stability for a trip of Liddell-Tamworth 330kV line	14.6	0.0	-14.6	10.6	0.0	-10.6	
N^^Q_NIL_B1		Out= Nil, avoid Voltage Collapse on loss of Kogan Creek	1313.7	83.8	-1229.9	1309.0	56.1	-1252.9	
N^Q_NIL_B		Out= Nil, avoid Voltage Collapse on loss of the largest of Tarong, Stanwell, Callide B or Swanbank E generators	448.5	0.1	-448.4	504.8	0.9	-503.9	
Q:N_NIL_BCK2L-G		Outage=Nil, limit Qld to NSW on QNI to avoid transient instability on 2L-G fault between Armidale and Bulli Creek	278.4	121.8	-156.6	253.1	108.0	-145.1	
N>>Q_NIL_LDMU (Summer Day)		Out = Nil, avoid Liddell to Muswellbrook (83) O/L on Liddell to Tamworth (84) trip (Summer Day)	9.7	0.0	-9.7	12.6	0.0	-12.6	
N>>Q_NIL_LDTW (Shoulder Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Day)	1066.5	923.1	-143.4	1023.7	898.5	-125.2	
N>>Q_NIL_LDTW (Shoulder Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Shoulder Night)	134.2	620.1	485.9	103.7	619.3	515.6	
N>>Q_NIL_LDTW (Summer Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Day)	439.7	386.0	-53.6	439.3	395.7	-43.5	
N>>Q_NIL_LDTW (Summer Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Summer Night)	112.5	509.1	396.6	115.6	537.9	422.3	
N>>Q_NIL_LDTW (Winter Day)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Day)	129.2	380.7	251.5	204.5	372.3	167.8	
N>>Q_NIL_LDTW (Winter Night)		Out = Nil, avoid Liddell to Tamworth (84) O/L on Liddell to Muswellbrook (83) trip (Winter Night)	0.2	326.0	325.8	0.0	314.2	314.2	
Total			5105.4	3350.6	-1754.9	5068.6	3302.9	-1765.7	