

Interconnection asset capacity and grid configuration Annual Report 2022 - 2023

**Pursuant to Electricity Industry Participation Code,
Part 12, clause 12.118 (1) (b) to (i)**

Background

1. Clause 12.118 of the Electricity Industry Participation Code requires Transpower to provide and publish an annual report on interconnection asset capacity and grid configuration by 30 November each year.
2. The annual report required under Clause 12.118 must contain those matters specified in clauses 12.118 (a) to (i)
3. This document is Transpower's annual report for the purposes of Clause 12.118

12.118 (1) (a): Reporting for the purposes of this clause by the Outage Protocol

The Outage Protocol Compliance Report was provided to the Electricity Authority on 30 November 2023.

12.118 (1) (b): Compliance in the preceding year with the requirements of clause 12.111(1)(a) and (2)

Transpower complied with clauses 12.111(1)(a) and (2) by making all interconnection assets available at the service levels in accordance with clause 12.107(4) and in the configuration as set out in the interconnection asset capacity and grid configuration drawings.

12.118 (1) (c): Specific instances of non-compliance with clause 12.111(1)(a) and (2)

There were no specific instances of non-compliance with clause 12.111(1)(a) and (2)

12.118 (1) (d): Circumstances that have given rise to any failure to comply with clause 12.111(1)(a) and (2)

There were no specific instances of non-compliance with clause 12.111(1)(a) and (2)

12.118 (1) (e): Steps taken to reduce the likelihood of failing to comply with clause 12.111(1)(a) and (2) in the future

Transpower endeavours to always make interconnection assets available at the service levels in accordance with clause 12.107(4) and in the configuration as set out in the interconnection asset capacity and grid configuration drawings.

12.118 (1) (f): Modifications made to interconnection circuit branches, the HVDC link, and each shunt asset under clause 12.112(1)(c) to (e) and the extent to which clause 12.112(2) has been complied with in respect of those modifications, including any specific instances of non-compliance

The following table provides details of the changes made to interconnection asset branches for the year ending 30 June 2023:

Branch	Rating Change	Reason
ISL.TF.T8	Commissioned	New transformer
ATI.OHK.1	Impedance	New spans associated with reactor installation
ATI.REA.112	Commissioned	New series reactor associated with ATI.OHK.1
BHL.PAK.1	Increased	Cable rating increase
BHL.PAK.2	Increased	Cable rating increase
BOB.BOT.1	Reconfigured	Circuits reconfigured for supplying Bombay from the 220kV
BOB.BOT.2	Reconfigured	Circuits reconfigured for supplying Bombay from the 220kV
BOB.WIR.1	Reconfigured	Wiri temporarily supplied from Bombay while OTA-WIR-1 reconducted. Wiri tee removed
BOB.WIR.2	Reconfigured	Wiri temporarily supplied from Bombay while OTA-WIR-2 reconducted. Wiri tee removed
BOB.HAM.2	Decommissioned	Circuit decommissioned as part of supplying Bombay from the 220kV
BOT.DRY.1	Reconfigured	Circuits reconfigured as part of supplying Bombay from the 220kV
BOT.DRY.2	Reconfigured	Circuits reconfigured as part of supplying Bombay from the 220kV
BOT.HLY.1	Reconfigured	Circuits reconfigured as part of supplying Bombay from the 220kV
BOT.HLY.2	Reconfigured	Circuits reconfigured as part of supplying Bombay from the 220kV
CST.SFD.2	Impedance	NPL-SFD-A and CST-NPL-A joined at permanent location
CST.SFD.3	Impedance	NPL-SFD-A and CST-NPL-A joined at permanent location
DRY.CB.482	Reconfigured	Circuits reconfigured as part of supplying Bombay from the 220kV
DRY.TAT.2	Reconfigured	Circuits reconfigured as part of supplying Bombay from the 220kV
HAM.OHW.1	Impedance	Small deviation involving 4 new structures
HAM.WKM.1	Impedance	Small deviation involving 4 new structures
HAY.TKR.1	Impedance	Haywards termination change
HAY.TKR.2	Impedance	Haywards termination change
HRP.TAB.1	Reconfigured	Circuit reconfigured for connection of Tauhara and Harapaki generation
HRP.RDF.1	Reconfigured	Circuit reconfigured for connection of Tauhara and Harapaki generation
JFD.WIL.1	Impedance	Partial reconductoring
JFD.WIL.2	Impedance	Partial reconductoring
PEN.REA.R862	Commissioned	New 220kV reactor
TAB.WRK.1	Reconfigured	Circuit reconfigured for connection of Tauhara and Harapaki generation

12.118 (1) (g): interconnection assets that have been permanently removed from service or any reconfigurations to the grid made, in accordance with clause 12.117

Interconnection 110kV circuit 2 between Bombay and Hamilton (BOB.HAM.2) was permanently removed from service to make way for the reconfiguration as part of supplying Bombay from the 220kV.

12.118 (1) (h): copies of any agreements made under clause 12.128 or, in respect of interconnection assets only, clause 12.151

No such agreements were made for the year ending 30 June 2023.

12.118 (1) (i): Updated interconnection asset capacity and grid configuration required under clause 12.107(1)

The interconnection asset capacity and grid configuration information required under clause 12.107(1) was delivered to the Electricity Authority on 30 November 2023.

Transfer capacity in the North and South direction for each configuration of the HVDC link

Summary of nominal continuous ratings for Pole 2: 1 cable and Pole 3: 2 cables

(Note: Statcom assumed in service as default arrangement)

	North flow		South flow	
	DC sent	AC received	DC sent	AC received
Pole 2 only	500 MW	475 MW	489 MW	463 MW
Pole 3 only	700 MW	651 MW	700 MW	651 MW
Pole 2 + Pole 3	1200 MW	1132 MW	850 MW	816 MW

Summary of short time overload ratings for Pole 2: 1 cable and Pole 3: 2 cables

	North flow		South flow	
	DC sent	AC received	DC sent	AC received
Pole 2	700 MW for 15 mins	650 MW	N/A	N/A
Pole 3	1000 MW for 30 mins	901 MW	N/A	N/A
Pole 2 + Pole 3	N/A	N/A	N/A	N/A

Shunt Assets that directly affect the ratings of HVDC (Preferred filter requirements assuming all filters are available)

Benmore bi-pole operation

No of Filters	In Service Combination			Bipole limits	
	F3/F4	F5/F6	F7	Performance (MW)	Rating (MW)
1	1	0	0	0	140
1	0	1	0	0	140
2	1	1	0	350	350
3	1	2	0	560	1200
4	1	2	1	1200	1200
5	2	2	1	1400	1400

Benmore mono-pole operation

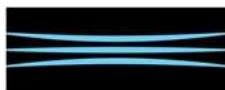
No of Filters	In Service Combination			Monopole limits	
	F3/F4	F5/F6	F7	Performance (MW)	Rating (MW)
1	0	1	0	280	350
2	1	1	0	420	700
3	1	1	1	700	1000
4	1	2	1	1000	1000
5	2	2	1	1000	1000

Haywards bi-pole operation

No of Filters	In Service Combination				Bipole limits	
	F3A/F4A	F3B/F4B	F5A/F6A	F5B	Performance (MW)	Rating (MW)
2	0	0	1	1	0	70
3	0	1	1	1	140	140
4	0	1	2	1	490	490
5	1	1	2	1	1000	1200
6	2	1	2	1	1200	1200
7	2	2	2	1	1400	1400

Haywards mono-pole operation

No of Filters	In Service Combination				Monopole limits	
	F3A/F4A	F3B/F4B	F5A/F6A	F5B	Performance (MW)	Rating (MW)
1	0	0	1	0	0	70
2	0	0	1	1	210	350
3	0	1	1	1	245	350
4	0	1	2	1	700	1000
5	1	1	2	1	1000	1000
6	1	2	2	1	1000	1000
7	2	2	2	1	1000	1000

**Service measures and levels for HVDC shunt assets****HAY F3A**

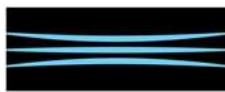
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY F3B

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [46.3] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY F4A

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



HAY F4B

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [46.3] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY F5A

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY F5B

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [49] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



HAY F6A

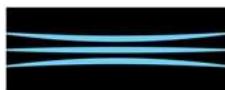
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY F7

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [15.7] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY F8

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [15.7] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



HAY STC31

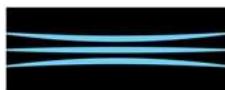
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [60] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [STATCOM]

BEN F3

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [79.3] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BEN F4

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [79.3] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



BEN F5

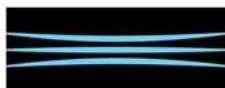
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [80] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BEN F6

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [80] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BEN F7

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [80] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



Service measures and levels for shunt assets

ALB-CAPS-C1

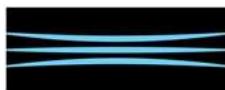
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ALB-CAPS-C2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [100] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ALB-SVC-7

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [100] Mvar Provision: [100] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [198] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [SVC]



BDE-CAPS-C1

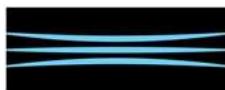
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.15] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BDE-CAPS-C2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.15] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BDE-CAPS-C4

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.15] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



BDE-CAPS-C5

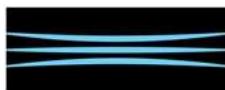
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.15] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BLN-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.1] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BLN-CAPS-C2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.1] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



BLN-CAPS-C3

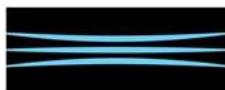
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.1] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BLN-CAPS-C4

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5.1] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

BRY-CAPS-C5A

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [30] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



BRY-CAPS-C7A

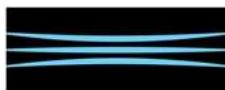
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [30] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

GYM-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [1] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

GYM-CAPS-C2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [2] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



GYM-CAPS-C3

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [4] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAM-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAM-STC-3

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [165] Mvar Provision: [165] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [99] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [STATCOM]



HAY-REA-R1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [40] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY-REA-R5

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [40] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HAY-SCM-SC1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [30] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]



HAY-SCM-SC2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [30] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]

HAY-SCM-SC3

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [18] Mvar Provision: [35] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]

HAY-SCM-SC4

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [18] Mvar Provision: [35] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]



HAY-SCM-SC7

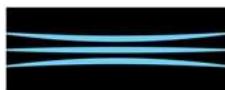
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [45] Mvar Provision: [65] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]

HAY-SCM-SC8

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [45] Mvar Provision: [65] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]

HAY-SCM-SC9

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [45] Mvar Provision: [65] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]



HAY-SCM-SC10

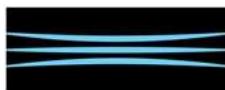
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [45] Mvar Provision: [65] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [Synchronous condenser]

HEN-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [75] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HEP-CAPS-C11

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



HEP-CAPS-C12

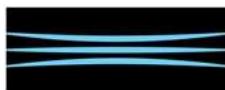
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HEP-CAPS-C13

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HKK-CAPS-C7

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [2] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



HKK-CAPS-C8

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [4] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

HKK-CAPS-C9

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [8] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-CAPS-C14

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [43.2] Mvar
Nominal voltage rating of the shunt asset	[66] kV
Voltage range that the shunt asset can operate over	Maximum: [72.6] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



ISL-CAPS-C15

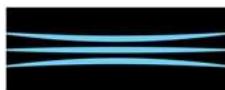
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [43.2] Mvar
Nominal voltage rating of the shunt asset	[66] kV
Voltage range that the shunt asset can operate over	Maximum: [72.6] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-CAPS-C16

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [43.2] Mvar
Nominal voltage rating of the shunt asset	[66] kV
Voltage range that the shunt asset can operate over	Maximum: [72.6] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-CAPS-C21

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [57] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



ISL-CAPS-C22

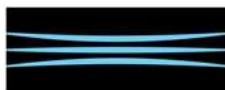
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-CAPS-C25

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-CAPS-C26

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [70.715] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



ISL-CAPS-C27

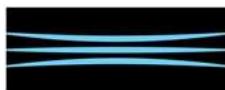
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [75] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-REA-R492

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [80] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [198] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ISL-SVC-3

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [50] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [SVC]



ISL-SVC-9

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [75] Mvar Provision: [150] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [198] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [SVC]

KIK-REA-R182

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [50] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [132] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

KIK-STC-2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [60] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [STATCOM]



KTA-CAPS-C1

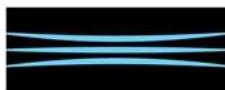
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [22.4] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

MDN-STC-5

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [40.0] Mvar Provision: [-33.8] Mvar
Nominal voltage rating of the shunt asset	[11.0] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [Dynamic] If dynamic: SVC/synchronous compensator: [STATCOM]

MDN-STC-6

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [40.0] Mvar Provision: [-33.8] Mvar
Nominal voltage rating of the shunt asset	[11.0] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [Dynamic] If dynamic: SVC/synchronous compensator: [STATCOM]



MTM-CAPS-C1

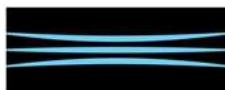
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [30.24] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

NMA-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [52.1] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

NMA-CAPS-C3

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [52.1] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



OHW-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [75] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [245] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

OHW-CAPS-C2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [75] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [245] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

ONG-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [2.5] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



OTA-CAPS-C11

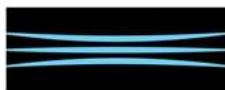
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [64.3] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

OTA-CAPS-C12

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [64.3] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

OTA-CAPS-C29

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [100] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



OTA-CAPS-C30

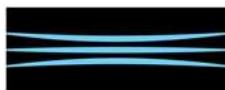
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [100] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [198] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

OTA-CAPS-C31

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [100] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [198] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

OTA-REA-R472

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [50] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [198] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



PEN-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [75] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [242] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

PEN-CAPS-C11

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

PEN-CAPS-C12

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



PEN-CAPS-C13

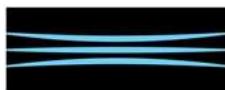
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [50] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

PEN-STC-1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [60] Mvar Provision: [60] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [dynamic] If dynamic: SVC/synchronous compensator: [STATCOM]

SBK-CAPS-C11

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [34.85] Mvar
Nominal voltage rating of the shunt asset	[66] kV
Voltage range that the shunt asset can operate over	Maximum: [72.6] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



STK-CAPS-C31

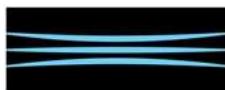
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [11.95] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

STK-CAPS-C32

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [11.95] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

STK-CAPS-C33

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [11.95] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



STK-CAPS-C34

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [11.95] Mvar
Nominal voltage rating of the shunt asset	[33] kV
Voltage range that the shunt asset can operate over	Maximum: [36.3] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

STK-CAPS-C7A

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

STK-CAPS-C7B

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



STK-CAPS-C7C

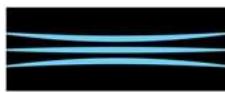
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

STK-CAPS-C7D

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [5] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

STK-REA-R7A

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [5] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



STK-REA-R7B

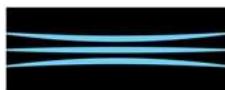
Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [5] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[11] kV
Voltage range that the shunt asset can operate over	Maximum: [12.1] kV Minimum: [9.9] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

TGA-CAPS-C11

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [40.98] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

TMU-CAPS-C1

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [15] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



TMU-CAPS-C2

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [N/A] Mvar Provision: [15] Mvar
Nominal voltage rating of the shunt asset	[110] kV
Voltage range that the shunt asset can operate over	Maximum: [121] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]

WRD-REA-R182

Service measure	Service level
Overall capacity rating of the shunt asset	Absorption: [63.7] Mvar Provision: [N/A] Mvar
Nominal voltage rating of the shunt asset	[220] kV
Voltage range that the shunt asset can operate over	Maximum: [245] kV Minimum: [N/A] kV
Is shunt asset dynamic or static	Dynamic/static: [static] If dynamic: SVC/synchronous compensator: [N/A]



Dates for seasonal rating periods as at 30 June 2023

Clause 12.107 (1) of the Electricity Industry Participation Code 2010 requires Transpower to provide the Authority with the dates for the summer and winter periods or other such defined periods as may apply for the purposes of establishing interconnection circuit branch and interconnection transformer branch capacity ratings.

Summer	From: 07:00 on 01 December to: 06:59 on 15 March
Shoulder	From: 07:00 on 15 March to: 06:59 on 10 May; and From: 07:00 on 20 October To: 06:59 on 01 December
Winter	From: 07:00 on 10 May To: 06:59 on 20 October

Branch	Resistive and												Nominal HV	Operating Voltage	Fault Current	Fault Current				
	Reactive				Resistive and				High voltage											
	Level of		Reactive		Level of		range that		branch can											
	Positive		Level of Zero		Sequence		Sequence		operate											
Branch	Overall continuous capacity rating				Impedance		Impedance		over		Voltage		From		Current					
	Summer		Shoulder		Winter		Resistance		Reactance		Resistance		Reactance		Maximum					
	Amps	MVA	Amps	MVA	Amps	MVA	PU (100MVA)	PU (100MVA)	PU (100MVA)	PU (100MVA)	kV	PU (100MVA)	PU (100MVA)	kV	Site	Site	Amp/sec			
ALB.HEN.3	1473	561.34	1549	590.21	1620	617.47	0.001791322	0.01564752	0.00983347	0.0461378	242	198	220	ALB	54600	HEN	45000			
ALB.HPI.1	1473	561.34	1549	590.21	1620	617.47	0.000960537	0.00859546	0.0053531	0.0268428	242	198	220	ALB	54600	HPI				
ALB.WRD.4	1926	733.9	1926	733.9	2070	788.78	0.000171281	0.00292831	0.00073719	0.0010568	242	198	220	ALB	69300	WRD	86600			
APS.CLH.1	232	26.51	259	29.61	283	32.39	0.256825069	0.40022039	0.39751148	1.3374265	72.6	59.4	66	APS	69300	CLH	69300			
APS.OTI.1	232	26.51	259	29.61	283	32.39	0.080578512	0.12700872	0.12740588	0.4464509	72.6	59.4	66	APS	69300	OTI	43300			
ARG.BLN.1	292	55.68	326	62.16	357	67.99	0.12151405	0.2326	0.20370496	0.7271322	121	99	110	ARG	45600	BLN	43300			
ARG.KIK.1	292	55.68	326	62.16	357	67.99	0.072649587	0.13855455	0.12178926	0.4329579	121	99	110	ARG	45600	KIK	45000			
ARI.BOB.1	266	50.68	297	56.59	325	61.92	0.21412314	0.41899752	0.36499256	1.3826686	121	99	110	ARI	45600	BOB	69300			
ARI.HAM.1	266	50.68	297	56.59	325	61.92	0.085755372	0.16460413	0.14314215	0.4859149	121	99	110	ARI	45600	HAM	43300			
ARI.HAM.2	266	50.68	297	56.59	325	61.92	0.085923967	0.16493306	0.14342231	0.4869455	121	99	110	ARI	45600	HAM	43300			
ARI.HTI.1	300	57.14	335	63.8	366	69.8	0.082126446	0.19097438	0.14832727	0.5944438	121	99	110	ARI	45600	HTI	43300			
ARI.KIN.1	300	57.14	335	63.8	366	69.8	0.054716529	0.12428926	0.09894876	0.3963942	121	99	110	ARI	32900	KIN	54600			
ARI.KIN.2	333	63.36	371	70.73	406	77.36	0.055465289	0.1227686	0.10044463	0.3979992	121	99	110	ARI	32900	KIN	54600			
ARI.RTO.1	300	57.14	335	63.8	366	69.8	0.061769421	0.14517686	0.11146777	0.4486686	121	99	110	ARI	45600	RTO				
ASB.BRY.1	1822	694.33	1917	730.31	2004	763.65	0.006452273	0.05511467	0.03476942	0.2135017	242	198	220	ASB	69300	BRY	54600			
ASB.ISL.1	1822	694.33	1917	730.31	2004	763.65	0.005560331	0.04755248	0.02996384	0.1838715	242	198	220	ASB	69300	ISL	45600			
ASB.OPI.1	1822	694.33	1917	730.31	2006	764.34	0.004827479	0.04127934	0.02601219	0.1603711	242	198	220	ASB	69300	OPI				
ASB.OPI.2	1822	694.33	1917	730.31	2000	762.1	0.004827479	0.04127934	0.02601219	0.1603711	242	198	220	ASB	39800	OPI				
ASY.SBK.1	333	38.02	371	42.44	406	46.41	0.049685491	0.10623508	0.08997934	0.3584481	72.6	59.4	66	ASY	43300	SBK	43300			
ASY.WPR.1	333	38.02	371	42.44	406	46.41	0.120585399	0.25784435	0.21837925	0.8816965	72.6	59.4	66	ASY	43300	WPR	43300			
ATI.OHK.1	874	333.13	908	346	940	358.32	0.001083471	0.00522066	0.00290021	0.0122857	242	198	220	ATI	45600	OHK	54600			
ATI.REA.112	9999	3,810.13	9999	3,810.13	9999	3,810.13	0.000111364	0.03512397			242	198	220	ATI	45400					
ATI.TRK.1	874	332.94	924	351.9	970	369.76	0.006202066	0.03695372	0.01980765	0.1134463	242	198	220	ATI	45600	TRK	20800			
ATI.TRK.2	874	332.94	924	351.9	970	369.76	0.006201446	0.03694959	0.01980558	0.1134333	242	198	220	ATI	45600	TRK	20800			
ATI.WKM.1	874	333.13	908	346	940	358.32	0.004377066	0.02101446	0.01165661	0.048394	242	198	220	ATI	45600	WKM	54600			
ATU.DOB.1	300	57.09	335	63.73	366	69.71	0.049638843	0.09535289	0.08495537	0.3219091	121	99	110	ATU	54600	DOB	54600			
ATU.RFC.1	292	55.68	326	62.16	357	67.99	0.072855372	0.14	0.12308347	0.4509132	121	99	110	ATU	54600	RFC				
AVI.BEN.1	530	201.99	591	225.39	647	246.43	0.003203306	0.01508388	0.00853265	0.0377756	242	198	220	AVI	45600	BEN	69300			
AVI.BEN.2	530	201.99	591	225.39	647	246.43	0.003200826	0.0150719	0.00852603	0.0377729	242	198	220	AVI	45600	BEN	69300			
AVI.WTK.1	1495	569.84	1572	599.15	1645	626.83	0.000739256	0.00553657	0.00339525	0.0189979	242	198	220	AVI	54600	WTK	39800			
BAL.BWK.1	266	50.68	297	56.59	325	61.92	0.094008264	0.18240496	0.15772231	0.5702488	121	99	110	BAL	43300	BWK	45600			
BAL.GOR.1	266	50.68	297	56.59	325	61.92	0.145689256	0.28724628	0.2438843	0.8764331	121	99	110	BAL	45600	GOR	43300			
BDE.EDN.1	266	50.68	297	56.59	325	61.92	0.024919835	0.04920744	0.0417562	0.1519132	121	99	110	BDE	43300	EDN	43300			
BDE.GOR.1	266	50.68	297	56.59	325	61.92	0.0304	0.0600686	0.05089422	0.1817306	121	99	110	BDE	43300	GOR	43300			
BDT.GNY.2	345	65.81	386	73.46	422	80.34	0.01775124	0.04185537	0.0332719	0.1394752	121	99	110	BDT		GNY				

BDT.WTK.2	333	63.36	371	70.73	406	77.36	0.071004959	0.15944876	0.13014793	0.5216661	121	99	110 BDT	WTK	45600
BEN.OHB.1	1464	558.03	1540	586.73	1611	613.84	0.002298347	0.02545992	0.01266963	0.0608335	242	198	220 BEN	69300 OHB	69300
BEN.OHC.2	1464	558.03	1540	586.73	1611	613.84	0.001797727	0.02117004	0.00997479	0.0482711	242	198	220 BEN	69300 OHC	54600
BEN.TWZ.1	1060	403.98	1183	450.78	1293	492.85	0.004248347	0.02952107	0.0184031	0.0866663	242	198	220 BEN	69300 TWZ	45600
BHL.PAK.1	2016	768.2	2016	768.2	2121	808.21	0.000217975	0.00397541	0.00079525	0.0013924	242	198	220 BHL	69300 PAK	
BHL.PAK.2	2016	768.2	2016	768.2	2121	808.21	0.000219628	0.00392417	0.0008031	0.0014062	242	198	220 BHL	69300 PAK	
BHL.WKM.1	3181	1,212.12	3181	1,212.12	3181	1,212.12	0.005672107	0.10804876	0.06235186	0.2507986	242	198	220 BHL	WKM	
BHL.WKM.2	3181	1,212.12	3181	1,212.12	3181	1,212.12	0.005671074	0.10803905	0.06234504	0.2502884	242	198	220 BHL	WKM	
BLN.STK.1	530	100.99	591	112.69	647	123.21	0.056170248	0.24010165	0.14962975	0.6499281	121	99	110 BLN	43300 STK	43300
BLN.STK.2	551	104.89	614	117.04	672	127.97	0.05207438	0.24011157	0.14553884	0.6603702	121	99	110 BLN	43300 STK	43300
BOB.HAM.1	266	50.68	297	56.59	325	61.92	0.130164463	0.25757603	0.22094132	0.8244198	121	99	110 BOB	69300 HAM	43300
BOB.WRT.1	324	61.69	364	69.26	399	76.05	0.034657851	0.08009422	0.0649124	0.2663421	121	99	110 BOB	WRT	
BOB.WRT.2	324	61.69	364	69.26	399	76.05	0.034657851	0.08009422	0.0649124	0.2663421	121	99	110 BOB	WRT	
BOT.DRY.1	1822	694.33	1917	730.31	2006	764.34	0.000559298	0.00491157	0.00301674	0.0145928	242	198	220 BOT	DRY	
BOT.DRY.2	1822	694.33	1917	730.31	2006	764.34	0.000559298	0.00491157	0.00301674	0.0145928	242	198	220 BOT	DRY	
BOT.HLY.1	1822	694.33	1917	730.31	2006	764.34	0.003126653	0.02743781	0.01685062	0.0813155	242	198	220 BOT	HLY	69300
BOT.HLY.2	1822	694.33	1917	730.31	2000	762.1	0.003125207	0.02742046	0.01684256	0.0812477	242	198	220 BOT	HLY	69300
BPC.WTK.1	333	63.36	371	70.73	406	77.36	0.052871074	0.11669174	0.09615537	0.3791777	121	99	110 BPC	WTK	45600
BPE.BRK.1	1822	694.33	1917	730.31	2006	764.34	0.004958264	0.04260103	0.02671198	0.1638736	242	198	220 BPE	45600 BRK	45600
BPE.BRK.2	1822	694.33	1870	712.57	1870	712.57	0.004970455	0.04273368	0.02677831	0.1641872	242	198	220 BPE	45600 BRK	45600
BPE.LTN.2	1822	694.33	1917	730.31	2006	764.34	0.00142624	0.01250744	0.00768326	0.0371048	242	198	220 BPE	45600 LTN	
BPE.MTN.1	345	65.81	386	73.46	422	80.34	0.044383471	0.10502727	0.08320496	0.3439298	121	99	110 BPE	45600 MTN	
BPE.MTR.1	300	57.14	335	63.8	366	69.8	0.107463636	0.25292066	0.19391157	0.7792504	121	99	110 BPE	34600 MTR	54600
BPE.MTT.2	345	65.81	386	73.46	422	80.34	0.044567769	0.1054843	0.08354793	0.3477182	121	99	110 BPE	45600 MTT	
BPE.PRT.1	931	354.71	979	373.09	1025	390.47	0.012052686	0.08211384	0.04038037	0.2260812	242	198	220 BPE	69300 PRT	
BPE.PRT.2	931	354.71	979	373.09	1025	390.47	0.012118802	0.08248141	0.0405657	0.2269523	242	198	220 BPE	69300 PRT	
BPE.TKU.1	807	307.52	845	321.85	880	335.48	0.029951033	0.14454339	0.0797843	0.4031339	242	198	220 BPE	69300 TKU	45600
BPE.TKU.2	807	307.52	845	321.85	880	335.48	0.029896074	0.14355868	0.07963884	0.4035167	242	198	220 BPE	69300 TKU	45600
BPE.TNG.1	627	238.85	699	266.49	765	291.34	0.015957025	0.09826343	0.05096095	0.2821087	242	198	220 BPE	69300 TNG	45600
BPE.TWT.1	1822	694.33	1917	730.31	2006	764.34	0.000795868	0.00698223	0.00428905	0.0207105	242	198	220 BPE	45600 TWT	
BPE.WDV.1	300	57.14	335	63.8	366	69.8	0.03318595	0.07576777	0.06036198	0.2457223	121	99	110 BPE	34600 WDV	54600
BPE.WDV.2	300	57.14	335	63.8	366	69.8	0.033183471	0.07576198	0.06035703	0.2457033	121	99	110 BPE	34600 WDV	54600
BRB.HPI.1	875	333.31	924	352.24	971	370.08	0.014072934	0.08721674	0.04767851	0.20587	242	198	220 BRB	54600 HPI	54600
BRB.MDN.1	1250	476.31	1250	476.31	1250	476.31	0.000239256	0.00220165	0.00133698	0.007013	242	198	220 BRB	54600 MDN	54600
BRK.SFD.1	610	232.53	685	260.95	752	286.38	0.013357645	0.08005806	0.04266012	0.2439548	242	198	220 BRK	45600 SFD	45600
BRK.SFD.2	610	232.53	685	260.95	752	286.38	0.013357025	0.0801624	0.04265826	0.24375	242	198	220 BRK	45600 SFD	45600
BRK.SFD.3	610	232.53	685	260.95	752	286.38	0.013463636	0.08170599	0.0430093	0.2373802	242	198	220 BRK	45600 SFD	69300
BRY.ISL.1	1822	694.33	1917	730.31	2004	763.65	0.001960537	0.01664546	0.0105593	0.0637572	242	198	220 BRY	54600 ISL	45600
BWK.HWB.1	266	50.68	297	56.59	325	61.92	0.064921488	0.12817851	0.10828595	0.3853793	121	99	110 BWK	45600 HWB	43300
CBG.HAM.1	300	57.14	335	63.8	366	69.8	0.028918182	0.06585041	0.05218265	0.2129107	121	99	110 CBG	45600 HAM	43300
CBG.HAM.2	300	57.14	335	63.8	366	69.8	0.02892314	0.06586198	0.05219256	0.2130165	121	99	110 CBG	45600 HAM	43300
CBG.KPO.1	300	57.14	335	63.8	366	69.8	0.010773554	0.02462645	0.01933884	0.073705	121	99	110 CBG	45600 KPO	54600
CBG.KPO.2	300	57.14	335	63.8	366	69.8	0.010775207	0.02463636	0.01934463	0.0736818	121	99	110 CBG	45600 KPO	69300
CLH.COL.1	232	26.51	259	29.61	283	32.39	0.176053719	0.26726814	0.2717011	0.950124	72.6	59.4	66 CLH	69300 COL	45600
CML.CYD.1	1464	558.03	1540	586.73	1611	613.84	0.001394835	0.01638306	0.00774339	0.0514523	242	198	220 CML	69300 CYD	69300
CML.CYD.2	1464	558.03	1540	586.73	1611	613.84	0.001394628	0.01637955	0.00774194	0.0514626	242	198	220 CML	69300 CYD	69300

CML.TWZ.1	1473	561.34	1549	590.21	1620	617.47	0.007893388	0.09383161	0.04423616	0.2981401	242	198	220 CML	69300 TWZ	69300
CML.TWZ.2	1473	561.34	1549	590.21	1620	617.47	0.007893802	0.09383409	0.0442374	0.2981698	242	198	220 CML	69300 TWZ	69300
COL.HOR.2	266	30.41	297	33.95	325	37.15	0.228709826	0.42511019	0.38821855	1.4936501	72.6	59.4	66 COL	45600 HOR	45600
COL.HOR.3	266	30.41	297	33.95	325	37.15	0.22859045	0.42498164	0.38803719	1.4931129	72.6	59.4	66 COL	45600 HOR	45600
COL.OTI.2	232	26.51	259	29.61	283	32.39	0.513578972	0.79438705	0.79682507	2.7354913	72.6	59.4	66 COL	45600 OTI	31600
CST.HUI.1	333	63.36	371	70.73	406	77.36	0.023038017	0.05043223	0.04171901	0.1391025	121	99	110 CST	43300 HUI	43300
CST.HUI.2	333	63.36	371	70.73	406	77.36	0.023019835	0.05039174	0.04168595	0.1389711	121	99	110 CST	43300 HUI	43300
CST.JRT.1	482	91.89	507	96.69	531	101.24	0.006417355	0.01390744	0.01162149	0.0425339	121	99	110 CST	43300 JRT	
CST.MNI.1	324	61.69	364	69.26	399	76.05	0.047843802	0.11131984	0.0888405	0.3032397	121	99	110 CST	43300 MNI	54600
CST.SFD.3	1220	232.53	1250	238.16	1250	238.16	0.013197521	0.11123967	0.07149422	0.4188711	121	99	110 CST	43300 SFD	54600
CUT.KIK.2	816	310.94	816	310.94	816	310.94	0.018534298	0.11406157	0.06021426	0.2746399	242	198	220 CUT	KIK	45600
CUT.KIK.3	816	310.94	816	310.94	816	310.94	0.018997727	0.11426942	0.06067996	0.2743353	242	198	220 CUT	KIK	54600
CUT.WTT.2	911	347.16	958	365.15	1003	382.17	0.005418595	0.03243988	0.01730826	0.088649	242	198	220 CUT	WTT	
CUT.WTT.3	911	347.16	958	365.15	1003	382.17	0.005418595	0.03243988	0.01730826	0.088649	242	198	220 CUT	WTT	
CYD.ROX.1	1862	709.42	1958	746.18	2049	780.95	0.002286364	0.02040103	0.01276302	0.0787469	242	198	220 CYD	69300 ROX	69300
CYD.ROX.2	1862	709.42	1958	746.18	2049	780.95	0.00228657	0.02040372	0.01276467	0.0787878	242	198	220 CYD	69300 ROX	69300
DOB.GYM.1	259	29.56	289	33	316	36.1	0.052380624	0.08146006	0.08639807	0.2708402	72.6	57.8	66 DOB	43300 GYM	27700
DOB.RFC.2	554	105.54	583	111.05	610	116.27	0.08807438	0.24103058	0.17988017	0.8422893	121	99	110 DOB	55400 RFC	
DRY.CB.412	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.CB.422	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.CB.432	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.CB.442	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.CB.452	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.CB.462	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.CB.482	4000	1,524.20	4000	1,524.20	4000	1,524.20	0	0			242	198	220 DRY	69300	
DRY.TAT.1	2991	1,139.68	3145	1,198.29	3290	1,253.65	0.000349174	0.00623409	0.0036657	0.0171928	242	198	220 DRY	TAT	
DRY.TAT.2	2991	1,139.68	3145	1,198.29	3290	1,253.65	0.000357851	0.00638781	0.0037562	0.0176155	242	198	220 DRY	TAT	
DVK.WDV.1	265	50.4	295	56.27	323	61.55	0.043534711	0.06844132	0.06891074	0.233	121	99	110 DVK	34600 WDV	54600
DVK.WDV.2	265	50.4	295	56.27	323	61.55	0.045168595	0.07157686	0.07149422	0.2424967	121	99	110 DVK	45600 WDV	54600
DVK.WPW.1	266	50.68	297	56.59	325	61.92	0.086684298	0.16498099	0.14452727	0.5392752	121	99	110 DVK	66000 WPW	55400
DVK.WPW.2	266	50.68	297	56.59	325	61.92	0.087786777	0.16709917	0.14642727	0.5477074	121	99	110 DVK	45600 WPW	55400
EDG.KAW.1	253	48.24	283	53.86	309	58.91	0.03138595	0.04933306	0.04841901	0.1462107	121	99	110 EDG	43300 KAW	45000
EDG.KAW.2	253	48.23	283	53.84	309	58.9	0.031759504	0.04982562	0.04899917	0.1463645	121	99	110 EDG	69300 KAW	54600
EDG.KAW.3	627	238.85	699	266.49	765	291.34	0.003166116	0.01924463	0.01011529	0.0470087	242	198	220 EDG	45600 KAW	54600
EDG.OWH.2	298	56.74	332	63.33	364	69.28	0.076172727	0.19146446	0.14341157	0.571676	121	99	110 EDG	45600 OWH	43300
EDG.TRK.1	627	238.85	699	266.49	765	291.34	0.009260744	0.05538595	0.02959959	0.1690519	242	198	220 EDG	22700 TRK	22700
EDG.TRK.2	627	238.85	699	266.49	765	291.34	0.009263017	0.05539463	0.02960475	0.1690791	242	198	220 EDG	22700 TRK	22700
EDN.INV.1	266	50.68	297	56.59	325	61.92	0.058976033	0.11671653	0.09857273	0.3554372	121	99	110 EDN	43300 INV	
FHL.RDF.1	266	50.68	297	56.59	325	61.92	0.014042975	0.02657438	0.0234281	0.0875562	121	99	110 FHL	34600 RDF	45400
FHL.RDF.2	266	50.68	297	56.59	325	61.92	0.014143802	0.02700744	0.02359504	0.0877033	121	99	110 FHL	34600 RDF	45400
FHL.TUI.1	530	100.99	591	112.69	647	123.21	0.077709091	0.17915537	0.21428512	1.0508116	121	99	110 FHL	34600 TUI	45600
FHL.WPW.1	266	50.68	297	56.59	325	61.92	0.082794215	0.15664793	0.13802149	0.5176223	121	99	110 FHL	45600 WPW	55400
FHL.WPW.2	266	50.68	297	56.59	325	61.92	0.082752066	0.15763719	0.1379686	0.5156339	121	99	110 FHL	45600 WPW	55400
GNY.STU.2	383	73.02	403	76.85	422	80.48	0.046176033	0.07343802	0.07309008	0.2481273	121	99	110 GNY	STU	45600
GOR.GOT.1	774	294.97	800	304.84	800	304.84	0.000267355	0.00166343	0.00087872	0.0036719	242	198	220 GOR	69300 GOT	
GOR.GOT.2	774	294.97	800	304.84	800	304.84	0.000272314	0.00168926	0.00089463	0.0037779	242	198	220 GOR	69300 GOT	

GOR.ROX.1	333	63.36	371	70.73	406	77.36	0.125928099	0.28022066	0.22804215	0.8941727	121	99	110 GOR	54600 ROX	45600
GOT.NMA.1	911	347.16	958	365.15	1003	382.17	0.007234298	0.04388141	0.02310413	0.1044839	242	198	220 GOT	NMA	69300
GOT.NMA.2	911	347.16	958	365.15	1003	382.17	0.007234917	0.04388492	0.02310599	0.1044948	242	198	220 GOT	NMA	69300
GOT.TMH.1	911	347.16	958	365.15	1003	382.17	0.020269628	0.12379174	0.06507128	0.2948597	242	198	220 GOT	TMH	69300
GOT.TMH.2	911	347.16	958	365.15	1003	382.17	0.020269628	0.12379174	0.06507107	0.2948593	242	198	220 GOT	TMH	69300
GYM.KUM.1	253	28.94	283	32.31	300	34.29	0.146235078	0.20168044	0.22561065	0.762702	72.6	59.4	66 GYM	27700 KUM	43300
GYT.MST.1	463	88.15	489	93.22	514	97.99	0.034363636	0.07456446	0.06223058	0.2087066	121	99	110 GYT	45600 MST	43300
GYT.MST.2	463	88.15	489	93.22	514	97.99	0.034361983	0.07456116	0.0622281	0.2086967	121	99	110 GYT	45600 MST	43300
GYT.UHT.1	333	63.36	371	70.73	406	77.36	0.046398347	0.09953471	0.08401901	0.3362719	121	99	110 GYT	45600 UHT	43300
GYT.UHT.2	333	63.36	371	70.73	406	77.36	0.046381818	0.09949917	0.08399008	0.3361521	121	99	110 GYT	45600 UHT	45600
HAM.OHW.1	1614	615.03	1689	643.71	1761	670.96	0.003483471	0.02275517	0.0151345	0.0751669	242	198	220 HAM	45600 OHW	
HAM.WKM.1	1614	615.03	1689	643.71	1761	670.96	0.00834938	0.05427459	0.03618368	0.1784014	242	198	220 HAM	45600 WKM	54600
HAY.JFD.1	1822	694.33	1917	730.31	2000	762.1	0.000391322	0.00335186	0.00210661	0.0111366	242	198	220 HAY	43300 JFD	
HAY.JFD.2	1822	694.33	1917	730.31	2000	762.1	0.000379132	0.00325537	0.00204504	0.010812	242	198	220 HAY	43300 JFD	
HAY.PRT.1	931	354.71	979	373.09	1025	390.47	0.003504132	0.02327066	0.0115281	0.0636304	242	198	220 HAY	43300 PRT	
HAY.PRT.2	931	354.71	979	373.09	1025	390.47	0.003504752	0.02327624	0.01153161	0.0636409	242	198	220 HAY	43300 PRT	
HAY.TKR.1	2160	411.46	2214	421.79	2266	431.8	0.003210744	0.02060248	0.0147281	0.0835339	121	99	110 HAY	54600 TKR	54600
HAY.TKR.2	2160	411.46	2214	421.79	2266	431.8	0.003212397	0.02061157	0.01473802	0.0836107	121	99	110 HAY	54600 TKR	54600
HAY.UHT.1	548	104.41	552	105.17	570	108.6	0.004232231	0.02468099	0.01849422	0.0741388	121	99	110 HAY	43300 UHT	45600
HAY.UHT.2	548	104.41	552	105.17	570	108.6	0.00424876	0.02477603	0.01860331	0.0742	121	99	110 HAY	34600 UHT	45600
HEN.HEP.1	501	95.43	527	100.42	552	105.15	0.009334711	0.02161157	0.01750083	0.0680529	121	99	110 HEN	45600 HEP	54600
HEN.HEP.2	501	95.43	527	100.42	552	105.15	0.009333884	0.02160992	0.01749917	0.0680331	121	99	110 HEN	43300 HEP	43300
HEN.HEP.3	501	95.43	527	100.42	552	105.15	0.009264463	0.0216876	0.01736777	0.0671893	121	99	110 HEN	45600 HEP	43300
HEN.HEP.4	501	95.43	527	100.42	552	105.15	0.009253719	0.02166116	0.01734628	0.0671008	121	99	110 HEN	45600 HEP	43300
HEN.HPI.1	1747	665.88	1847	703.81	1941	739.52	0.000831405	0.00705083	0.00447769	0.0192355	242	198	220 HEN	69300 HPI	
HEN.OTA.1	2400	914.52	2400	914.52	2400	914.52	0.002180992	0.01908698	0.01177541	0.058719	242	198	220 HEN	45600 OTA	69300
HEN.SWN.1	2400	914.52	2400	914.52	2400	914.52	0.001776446	0.01554835	0.00957107	0.0476829	242	198	220 HEN	45600 SWN	43300
HEN.WEL.1	292	55.68	326	62.16	357	67.99	0.123877686	0.2184438	0.20767107	0.772538	121	99	110 HEN	45600 WEL	45600
HEN.WEL.2	292	55.68	326	62.16	357	67.99	0.123944628	0.21857025	0.20779174	0.7730628	121	99	110 HEN	45600 WEL	45600
HEP.ROS.1	800	152.42	800	152.42	800	152.42	0.005149587	0.01187686	0.01416942	0.0580702	121	99	110 HEP	45600 ROS	45600
HEP.ROS.2	800	152.42	800	152.42	800	152.42	0.004960331	0.0113124	0.01368182	0.0635521	121	99	110 HEP	45600 ROS	45600
HKK.OTI.2	232	26.51	259	29.61	283	32.39	0.436999541	0.65654959	0.67742195	2.3421809	72.6	59.4	66 HKK	21700 OTI	43300
HLY.OHW.1	1822	694.33	1917	730.31	2006	764.34	0.00116095	0.0102	0.00626384	0.0325636	242	198	220 HLY	69300 OHW	
HLY.OHW.2	1822	694.33	1917	730.31	2006	764.34	0.00116095	0.01018409	0.00625558	0.0327798	242	198	220 HLY	69300 OHW	
HLY.SFD.1	930	354.38	930	354.38	930	354.38	0.039089256	0.23494215	0.12487376	0.7122496	242	198	220 HLY	69300 SFD	69300
HLY.TWH.1	1231	469.17	1262	480.9	1292	492.27	0.00417624	0.02505971	0.01336674	0.0745322	242	198	220 HLY	69300 TWH	54600
HOB.PEN.1	2360	899.28	2360	899.28	2400	914.52	0.000199793	0.00200145	0.00141095	0.0009413	242	198	220 HOB	86600 PEN	69300
HOB.WRD.1	1930	735.43	1930	735.43	2070	788.78	0.000210744	0.00314566	0.00098533	0.001194	242	198	220 HOB	86600 WRD	86600
HOR.KBT.1	547	62.53	570	65.2	593	67.74	0.059639578	0.14008265	0.11180441	0.4698554	69.3	59.4	66 HOR	45600 KBT	
HOR.KBT.2	547	62.53	570	65.2	593	67.74	0.059625803	0.14004821	0.11177686	0.4697406	69.3	59.4	66 HOR	45600 KBT	
HPI.MDN.1	1600	609.68	1600	609.68	1600	609.68	0.007429132	0.06322314	0.04004112	0.1775157	242	198	220 HPI	54600 MDN	45600
HRP.TAB.1	1254	477.69	1399	532.98	1529	582.67	0.005494008	0.04697066	0.02960413	0.1827756	242	198	220 HRP	69300 TAB	69300
HTI.RTO.1	333	63.36	371	70.73	406	77.36	0.021004959	0.04521157	0.03808595	0.1537322	121	99	110 HTI	45600 RTO	
HTI.TMU.1.W/	554	105.54	583	111.05	610	116.27	0.038920661	0.10900744	0.07952893	0.2642727	121	99	110 HTI	69300 TMU	54600
HUI.MNI.1	501	95.43	527	100.42	552	105.15	0.011832231	0.02834463	0.02218265	0.0706446	121	99	110 HUI	43300 MNI	54600
HWA.SFD.1	805	153.41	836	159.36	866	165.05	0.021318182	0.08907851	0.05375289	0.2813959	121	99	110 HWA	43300 SFD	54600

HWA.WVY.1	805	153.41	836	159.36	866	165.05	0.028430579	0.11960331	0.07166364	0.3560694	121	99	110 HWA	55400 WVY	45600
HWB.ROX.1	333	63.36	371	70.73	406	77.36	0.190460331	0.43632645	0.34489422	1.3440769	121	99	110 HWB	45600 ROX	43300
HWB.ROX.2	333	63.36	371	70.73	406	77.36	0.190463636	0.43629917	0.34489669	1.344086	121	99	110 HWB	45600 ROX	45600
HWB.SDN.1	875	333.31	924	352.24	971	370.08	0.001717562	0.01028141	0.00549855	0.0290986	242	198	220 HWB	45600 SDN	45600
HWB.TMH.1	875	333.31	924	352.24	971	370.08	0.000521281	0.00311963	0.00166364	0.0087948	242	198	220 HWB	45600 TMH	69300
IGH.KIK.2	482	91.89	507	96.69	531	101.24	0.058002479	0.35126364	0.18775868	0.799295	121	99	110 IGH	45600 KIK	43300
IGH.MCH.1	292	55.68	326	62.16	357	67.99	0.067084298	0.13120413	0.11250083	0.3913298	121	99	110 IGH	43300 MCH	69300
IGH.RFC.1	292	55.68	326	62.16	357	67.99	0.051901653	0.10033141	0.08701736	0.3057306	121	99	110 IGH	45600 RFC	
IGH.RFC.2	554	105.54	583	111.05	610	116.27	0.03185124	0.08397686	0.06506694	0.3040017	121	99	110 IGH	43300 RFC	
INV.MAN.2	818	311.61	912	347.6	997	379.93	0.013277686	0.09174711	0.05741364	0.3007574	242	198	220 INV	45600 MAN	54600
INV.NMA.1	1060	403.98	1183	450.78	1200	457.26	0.000968595	0.00634773	0.00419422	0.0197014	242	198	220 INV	45600 NMA	69300
INV.ROX.1	911	347.16	958	365.15	1003	382.17	0.018427686	0.11252314	0.05885186	0.271894	242	198	220 INV	45600 ROX	45600
INV.ROX.2	911	347.16	958	365.15	1003	382.17	0.01809814	0.11216694	0.05780393	0.3231262	242	198	220 INV	45600 ROX	45600
INV.TWI.1	1011	385.42	1128	429.87	1200	457.26	0.002108678	0.01532893	0.00977417	0.0531229	242	198	220 INV	45600 TWI	54600
INV.TWI.2	1011	385.42	1128	429.87	1200	457.26	0.00211157	0.01534876	0.00978698	0.0534174	242	198	220 INV	45600 TWI	54600
ISL.KBT.1	519	59.33	523	59.79	545	62.3	0.134481175	0.33837006	0.26172406	1.119713	69.3	59.4	66 ISL	43300 KBT	
ISL.KBT.2	519	59.33	523	59.79	545	62.3	0.134476584	0.3383494	0.26171258	1.1196419	69.3	59.4	66 ISL	43300 KBT	
ISL.KIK.1	627	238.85	699	266.49	765	291.34	0.031997727	0.20029463	0.10219298	0.5618198	242	198	220 ISL	54600 KIK	45600
ISL.NWD.1	1060	403.98	1183	450.78	1293	492.85	0.002430992	0.01690372	0.0105188	0.0580907	242	198	220 ISL	54600 NWD	
ISL.SBK.1	527	60.21	549	62.78	571	65.23	0.106639118	0.22469467	0.19309229	0.7852778	69.3	59.4	66 ISL	54600 SBK	43300
ISL.SBK.2	527	60.21	549	62.78	571	65.23	0.106623049	0.22466253	0.19306474	0.7851653	69.3	59.4	66 ISL	45600 SBK	43300
ISL.TKB.1	1461	556.65	1546	589.22	1600	609.68	0.019618388	0.13389256	0.08489504	0.3855955	242	198	220 ISL	54600 TKB	45600
ISL.WTT.2	911	347.16	958	365.15	1003	382.17	0.007303306	0.04800496	0.02594484	0.1351899	242	198	220 ISL	45600 WTT	
ISL.WTT.3	911	347.16	958	365.15	1003	382.17	0.007519215	0.04800393	0.02615971	0.1351864	242	198	220 ISL	54600 WTT	
JFD.LTN.1	1822	694.33	1917	730.31	2006	764.34	0.007127273	0.06251343	0.03840248	0.1850409	242	198	220 JFD	LTN	125000
JFD.LTN.2	1822	694.33	1917	730.31	2006	764.34	0.007126653	0.06251426	0.03840269	0.1850446	242	198	220 JFD	LTN	69300
JFD.WIL.1	1382	526.45	1435	546.62	1485	565.9	0.002031612	0.0190719	0.01057397	0.0573661	242	198	220 JFD	WIL	54600
JFD.WIL.2	1382	526.45	1435	546.62	1485	565.9	0.002027479	0.01903079	0.01055455	0.0572161	242	198	220 JFD	WIL	54600
JRT.SFD.1	482	91.89	507	96.69	531	101.24	0.047939669	0.10396777	0.08681074	0.317605	121	99	110 JRT	SFD	43300
KAW.OHK.1	627	238.85	699	266.49	765	291.34	0.012500826	0.07651281	0.03992996	0.1843388	242	198	220 KAW	33300 OHK	
KIK.MCH.1	292	55.68	326	62.16	357	67.99	0.097047934	0.19008265	0.16270165	0.5706264	121	99	110 KIK	43300 MCH	69300
KIK.STK.1	627	238.85	699	266.49	765	291.34	0.007304959	0.04352934	0.02333141	0.1143624	242	198	220 KIK	45600 STK	45600
KIK.STK.2	627	238.85	699	266.49	765	291.34	0.007307438	0.04354298	0.02333884	0.1144409	242	198	220 KIK	45600 STK	45600
KIK.STK.3	292	55.68	326	62.16	357	67.99	0.095590083	0.18373388	0.16024876	0.5685479	121	99	110 KIK	43300 STK	43300
KIN.LFT.1	266	50.68	297	56.59	325	61.92	0.029267769	0.06038099	0.04962397	0.1812603	121	99	110 KIN	54600 LFT	
KIN.LFT.2	333	63.36	371	70.73	406	77.36	0.026836364	0.05975703	0.04859587	0.1910198	121	99	110 KIN	54600 LFT	
KMO.MTM.1	333	63.36	371	70.73	406	77.36	0.014308264	0.02876033	0.02657355	0.0935669	121	99	110 KMO	54600 MTM	45600
KMO.TMI.1	333	63.36	371	70.73	406	77.36	0.026804959	0.05989174	0.04855372	0.1898612	121	99	110 KMO	43300 TMI	43300
KMO.TRK.1	955	363.85	999	380.78	1042	396.87	0.005482231	0.03267479	0.01751157	0.10013	121	99	220 KMO	54600 TRK	54600
KMO.TRK.2	955	363.85	999	380.78	1042	396.87	0.005483678	0.0326843	0.01751653	0.1001632	121	99	220 KMO	54600 TRK	54600
KPO.TMU.1	333	63.36	371	70.73	406	77.36	0.033328099	0.07432893	0.06035041	0.2344802	121	99	110 KPO	69300 TMU	45600
KUM.OTI.1	232	26.51	259	29.61	283	32.39	0.37639348	0.56657484	0.58538108	2.0441162	72.6	59.4	66 KUM	43300 OTI	43300
LFT.TRK.1	266	50.68	297	56.59	325	61.92	0.05592314	0.13021074	0.10034793	0.3990372	121	99	110 LFT	TRK	45600
LFT.TRK.2	333	63.36	371	70.73	406	77.36	0.066660331	0.14896777	0.12070165	0.4761512	121	99	110 LFT	TRK	43300
LIV.NSY.1	1600	609.53	1683	641.18	1761	671.11	0.004094628	0.03069029	0.01879194	0.1076643	242	198	220 LIV	69300 NSY	69300
LIV.NWD.1	1060	403.98	1183	450.78	1293	492.85	0.018180992	0.13213843	0.08141219	0.4639014	242	198	220 LIV	39800 NWD	

LIV.WTK.1	1495	569.84	1572	599.15	1645	626.83	0.002832025	0.02124773	0.01299793	0.0744221	242	198	220 LIV	39800 WTK	39800
LTN.TWT.1	1822	694.33	1917	730.31	2006	764.34	0.000629752	0.00552211	0.00339236	0.0163783	242	198	220 LTN	45600 TWT	
MAN.NMA.1	818	311.61	912	347.6	997	379.93	0.012270661	0.08767624	0.0530031	0.2848227	242	198	220 MAN	45600 NMA	69300
MAN.NMA.2	818	311.61	912	347.6	997	379.93	0.012275207	0.08770723	0.05302211	0.2849041	242	198	220 MAN	54600 NMA	69300
MAN.NMA.3	818	311.61	912	347.6	997	379.93	0.012299793	0.08532831	0.05317438	0.2808514	242	198	220 MAN	33800 NMA	69300
MDN.MPE.1	1200	228.63	1200	228.63	1200	228.63	0.010599174	0.06248843	0.04610165	0.1807182	121	99	110 MDN	43300 MPE	45600
MDN.MPE.2	1477	281.44	1561	297.5	1641	312.62	0.010415702	0.06249256	0.04591901	0.180738	121	99	110 MDN	43300 MPE	69300
MGM.MST.1	709	135.1	746	142.14	781	148.79	0.045418182	0.17920248	0.11445703	0.6204008	121	99	110 MGM	43300 MST	43300
MGM.WDV.1	709	135.1	746	142.14	781	148.79	0.021113223	0.08591157	0.05347025	0.2863504	121	99	110 MGM	43300 WDV	54600
MKT.MNI.1	501	95.43	527	100.42	552	105.15	0.007901653	0.01893141	0.01481157	0.0491364	121	99	110 MKT	MNI	54600
MKT.SFD.1	482	91.89	507	96.69	531	101.24	0.067971074	0.1534719	0.1248	0.4389959	121	99	110 MKT	SFD	43300
MNG.OTA.1	1600	304.84	1600	304.84	1600	304.84	0.001021488	0.00780992	0.00550165	0.0291372	121	99	110 MNG	69300 OTA	54600
MNG.OTA.2	1600	304.84	1600	304.84	1600	304.84	0.001028926	0.00786612	0.00554132	0.0293942	121	99	110 MNG	69300 OTA	54600
MNG.ROS.1	501	95.43	527	100.42	552	105.15	0.016233058	0.03815455	0.03051901	0.1271479	121	99	110 MNG	69300 ROS	45600
MNG.ROS.2	501	95.43	527	100.42	552	105.15	0.016242149	0.03822479	0.0305686	0.1274727	121	99	110 MNG	69300 ROS	45600
MPE.MTO.1	292	55.68	326	62.16	357	67.99	0.070519008	0.1243843	0.11821074	0.4375802	121	99	110 MPE	69300 MTO	
MPE.MTO.2	292	55.68	326	62.16	357	67.99	0.070522314	0.12441984	0.11821653	0.4375372	121	99	110 MPE	43300 MTO	
MTM.PIE.2	333	63.36	371	70.73	406	77.36	0.01397438	0.02931322	0.02469669	0.0929595	121	99	110 MTM	45600 PIE	
MTN.WGN.1	345	65.81	386	73.46	422	80.34	0.039039669	0.09237438	0.0731843	0.303505	121	99	110 MTN	WGN	45600
MTO.WEL.1	292	55.68	326	62.16	357	67.99	0.050839669	0.09304959	0.08528512	0.3041446	121	99	110 MTO	WEL	
MTO.WEL.2	292	55.68	326	62.16	357	67.99	0.050841322	0.09302314	0.0852876	0.3042182	121	99	110 MTO	WEL	
MTR.OKN.1	300	57.14	335	63.8	366	69.8	0.059679339	0.13994546	0.10769587	0.4311645	121	99	110 MTR	45600 OKN	54600
MTT.WGN.2	345	65.81	386	73.46	422	80.34	0.038972727	0.09221818	0.07305868	0.3029934	121	99	110 MTT	WGN	45600
NMA.TWI.1	1006	383.15	1121	427.34	1226	467.01	0.003069008	0.0221155	0.01416529	0.0739804	242	198	220 NMA	69300 TWI	54600
NMA.TWI.2	1006	383.15	1121	427.34	1226	467.01	0.003068802	0.02211446	0.01416426	0.0739756	242	198	220 NMA	69300 TWI	54600
NSY.ROX.1	1600	609.53	1683	641.18	1761	671.11	0.00802438	0.06014566	0.03683368	0.2083101	242	198	220 NSY	69300 ROX	69300
OHA.TWZ.1	911	347.16	958	365.15	1003	382.17	0.001117769	0.00678306	0.00357314	0.0197101	242	198	220 OHA	45600 TWZ	54600
OHA.TWZ.2	911	347.16	958	365.15	1003	382.17	0.001118182	0.00678657	0.00357479	0.0197198	242	198	220 OHA	45600 TWZ	54600
OHB.TWZ.3	1822	694.33	1917	730.31	2006	764.34	0.000251563	0.00219401	0.00135723	0.0058401	242	198	220 OHB	43300 TWZ	45600
OHC.TWZ.4	1822	694.33	1917	730.31	2006	764.34	0.000832231	0.00724814	0.00448388	0.0208353	242	198	220 OHC	54600 TWZ	45600
OHK.WRK.1	874	333.13	908	346	940	358.32	0.00475062	0.02280558	0.01265579	0.0524521	242	198	220 OHK	WRK	69300
OHW.OTA.1	1614	615.03	1689	643.71	1761	670.96	0.006669421	0.04323017	0.02886095	0.1417223	242	198	220 OHW	OTA	54600
OHW.OTA.2	1614	615.03	1689	643.71	1761	670.96	0.006689876	0.04339442	0.02899318	0.142156	242	198	220 OHW	OTA	69300
OHW.WKM.1	1614	615.03	1689	643.71	1761	670.96	0.01087314	0.07048884	0.04706198	0.2311428	242	198	220 OHW	WKM	54600
OKE.OWH.1	298	56.74	332	63.33	364	69.28	0.012394215	0.04573141	0.02894876	0.1225355	121	99	110 OKE	OWH	43300
OKE.TMI.1	333	63.36	371	70.73	406	77.36	0.039347107	0.08777273	0.07124959	0.281081	121	99	110 OKE	TMI	43300
OKE.TRK.1	333	63.36	371	70.73	406	77.36	0.03143719	0.06996281	0.05692314	0.2235868	121	99	110 OKE	TRK	43300
OKN.RTR.1	300	57.14	335	63.8	366	69.8	0.044094215	0.10162975	0.07955785	0.3200769	121	99	110 OKN	54600 RTR	
ONG.RTO.1	300	57.14	335	63.8	366	69.8	0.076939669	0.18080744	0.13883884	0.5596587	121	99	110 ONG	45600 RTO	
ONG.RTR.1	300	57.14	335	63.8	366	69.8	0.075433884	0.17735868	0.1361281	0.547243	121	99	110 ONG	45600 RTR	
OPI.TIM.1	640	244.04	715	272.28	781	297.67	0.004320868	0.02735248	0.01421798	0.0817806	242	198	220 OPI	TIM	39800
OPI.TIM.2	640	244.04	715	272.28	781	297.67	0.004320661	0.02735165	0.01421756	0.0817781	242	198	220 OPI	TIM	39800
OPI.TWZ.1	1822	694.33	1917	730.31	2004	763.65	0.005216736	0.04460785	0.02810992	0.1632419	242	198	220 OPI	TWZ	45600
OPI.TWZ.2	1822	694.33	1917	730.31	2004	763.65	0.005216736	0.04460785	0.02810971	0.1632417	242	198	220 OPI	TWZ	69300
OTA.AIS.GIS.4	1788	681.32	1820	693.51	1913	728.95	1.22E-05	9.77E-05	7.87E-05	0.0002581	242	198	220 OTA		69300
OTA.AIS.GIS.5	1788	681.32	1820	693.51	1913	728.95	2.05E-05	0.00016405	0.00013203	0.0004331	242	198	220 OTA		54600

OTA.OTC.3	1808	688.94	1841	701.52	1935	737.33	5.39E-05	0.00049132	0.00030289	0.0013463	242	198	220 OTA	69300 OTC	69300
OTA.PAK.3	1600	609.68	1600	609.68	1600	609.68	0.00017438	0.0030843	0.00182645	0.010386	242	198	220 OTA	45600 PAK	
OTA.PAK.4	2991	1,139.68	3145	1,198.29	3150	1,200.31	0.00016157	0.00287686	0.00169153	0.0096694	242	198	220 OTA	86600 PAK	
OTA.PEN.2	786	149.75	798	152.04	831	158.33	0.005728926	0.01517686	0.01772562	0.0505942	121	99	110 OTA	54600 PEN	54600
OTA.PEN.5	1231	469.17	1262	480.9	1292	492.27	0.001308471	0.00806839	0.00421942	0.0196105	242	198	220 OTA	86600 PEN	
OTA.ROS.1	415	79.07	440	83.83	458	87.26	0.0258	0.05954298	0.05005124	0.1495182	121	99	110 OTA	54600 ROS	45600
OTA.ROS.2	415	79.07	440	83.83	458	87.26	0.025668595	0.05878595	0.04961488	0.1477273	121	99	110 OTA	50200 ROS	45600
OTA.SWN.1	2400	914.52	2400	914.52	2400	914.52	0.000411157	0.00362996	0.00223512	0.0111407	242	198	220 OTA	45600 SWN	43300
OTA.TAT.1	2991	1,139.68	3145	1,198.29	3150	1,200.31	0.000378926	0.00675041	0.00396963	0.0186072	242	198	220 OTA	69300 TAT	
OTA.TAT.2	1779	677.89	1806	688.18	1900	724	0.000396281	0.00681343	0.00405083	0.0187729	242	198	220 OTA	69300 TAT	
OTA.WKM.1	770	293.44	810	308.67	848	323.09	0.034746281	0.16770579	0.09288182	0.4693415	242	198	220 OTA	69300 WKM	54600
OTA.WKM.2	770	293.44	810	308.67	848	323.09	0.034367149	0.1678657	0.09247128	0.4692306	242	198	220 OTA	69300 WKM	54600
OTC.PEN.6	1231	469.17	1262	480.9	1292	492.27	0.001281612	0.0078905	0.00412975	0.0191645	242	198	220 OTC	54600 PEN	45600
PAK.PEN.3	2294	874.13	2294	874.13	2449	933.19	0.000271281	0.00387004	0.00138719	0.0011628	242	198	220 PAK	PEN	69300
PEN.REA.R862	1500	571.58	1500	571.58	1500	571.58	0.00010124	0.03719008			242	198	220 PEN	14500	
PEN.T34.G2	1258	479.36	1289	491.35	1320	502.97	3.31E-06	2.11E-05	1.10E-05	6.22E-05	242	198	220 PEN	69300 T34	
PEN.T34.G4	2400	914.52	2400	914.52	2400	914.52	3.72E-06	3.57E-05	2.15E-05	0.0001349	242	198	220 PEN	45600 T34	
RDF.TUI.1	300	57.15	335	63.81	366	69.81	0.146998347	0.33433884	0.26532314	1.085962	121	99	110 RDF	45400 TUI	43300
RDF.TUI.2	300	57.15	335	63.81	366	69.81	0.146990083	0.33431818	0.26530661	1.0858942	121	99	110 RDF	TUI	45600
RDF.WHI.1	1254	477.69	1399	532.98	1529	582.67	0.001603099	0.01373017	0.00864029	0.0512636	242	198	220 RDF	45600 WHI	54600
RDF.WRK.1	1254	477.69	1399	532.98	1529	582.67	3.68E-05	0.00031426	0.00019814	0.0012233	242	198	220 RDF	WRK	
ROX.TMH.1	1011	385.42	1128	429.87	1233	469.78	0.006995868	0.06329132	0.03791198	0.2373271	242	198	220 ROX	45600 TMH	69300
ROX.TMH.2	1011	385.42	1128	429.87	1233	469.78	0.006995455	0.0632874	0.03790971	0.2373124	242	198	220 ROX	45600 TMH	69300
RPO.TNG.1	627	238.85	699	266.49	765	291.34	0.008031198	0.04908409	0.02565227	0.1387787	242	198	220 RPO	54600 TNG	45600
RPO.WRK.1	955	363.85	999	380.78	1042	396.87	0.010283471	0.06302975	0.03284194	0.1836638	242	198	220 RPO	54600 WRK	69300
SBK.WPR.1	333	38.02	371	42.44	406	46.41	0.14510101	0.31027319	0.26277548	1.0593572	72.6	59.4	66 SBK	43300 WPR	43300
SDN.TMH.1	875	333.31	924	352.24	971	370.08	0.001190083	0.00711219	0.00380124	0.0200888	242	198	220 SDN	45600 TMH	69300
SFD.TMN.1	1231	469.17	1262	480.9	1292	492.27	0.015252273	0.09232707	0.04872252	0.2767595	242	198	220 SFD	45600 TMN	69300
STU.TIM.1	253	48.23	283	53.84	309	58.9	0.101581818	0.16239669	0.16116612	0.5454835	121	99	110 STU	45600 TIM	21700
THI.WKM.1	2370	902.91	2492	949.53	2608	993.6	0.001577479	0.02105599	0.01207893	0.0602275	242	198	220 THI	WKM	69300
THI.WRK.1	2370	902.91	2492	949.53	2608	993.6	0.000247107	0.00329194	0.00189256	0.0093595	242	198	220 THI	WRK	69300
TKB.TWZ.1	1461	556.65	1546	589.22	1600	609.68	0.002333678	0.01603141	0.01012252	0.0493837	242	198	220 TKB	45600 TWZ	45600
TKR.WIL.1	1477	281.44	1561	297.5	1641	312.62	0.006047934	0.03857603	0.02726033	0.1107752	121	99	110 TKR	69300 WIL	43300
TKR.WIL.2	1477	281.44	1561	297.5	1641	312.62	0.006054545	0.03874793	0.02732066	0.1113603	121	99	110 TKR	69300 WIL	43300
TKU.WKM.1	807	307.52	845	321.85	880	335.48	0.012482645	0.06019463	0.03325351	0.1673959	242	198	220 TKU	45600 WKM	54600
TKU.WKM.2	807	307.52	845	321.85	880	335.48	0.012551446	0.06015165	0.0334376	0.1692891	242	198	220 TKU	45600 WKM	54600
TMN.TWH.1	1231	469.17	1262	480.9	1292	492.27	0.020184504	0.12082479	0.06449752	0.3679744	242	198	220 TMN	69300 TWH	54600
WGN.WVY.1	805	153.41	836	159.36	866	165.05	0.038241322	0.16009752	0.09637025	0.4987289	121	99	110 WGN	45600 WVY	45600
WHI.WRK.1	1254	477.69	1399	532.98	1529	582.67	0.007935744	0.06784298	0.04276405	0.2628754	242	198	220 WHI	45600 WRK	45600
WKM.WKM.AI	2694	1,026.61	2797	1,065.98	2896	1,103.63	3.33E-05	0.00043533	0.00025517	0.001149	242	198	220 WKM	WKM	69300
WKM.WKM.AI	2694	1,026.61	2797	1,065.98	2896	1,103.63	3.31E-05	0.00043203	0.0002531	0.0011403	242	198	220 WKM	WKM	69300
WKM.WRK.1	2370	902.91	2492	949.53	2500	952.63	0.001847521	0.02465496	0.01414855	0.0702868	242	198	220 WKM	WRK	69300
WPR.WTT.2	870	331.51	870	331.51	870	331.51	2.07E-05	0.00013223	6.80E-05	0.0003545	242	198	220 WPR	55400 WTT	
WPR.WTT.3	870	331.51	870	331.51	870	331.51	2.73E-05	0.00017066	8.88E-05	0.0005159	242	198	220 WPR	55400 WTT	

Branch	Tap Changer	Tap		Tapping step size as % of nominal operating voltage				On-Load/Off-Load	On-Load tapping capability	Auto selected	Normally set tap position	Off-Load normally set tap position
		Voltage Range	(kV)	Number of Tapping Steps	nominal operating voltage	On-Load						
		Maximum	Minimum			Load						
ALB.TF.T5	ALB-TF-T5-Tap Changer -- ON	242	187	20	1.25	ONLOAD	Automatic	No				
BPE.TF.T2	BPE-TF-T2-Tap Changer	242	198	16	1.25	ONLOAD	Manual				8	
BPE.TF.T3	BPE-TF-T3-Tap Changer	242	198	16	1.25	ONLOAD	Manual				8	
DOB.TF.T11	DOB-TF-T11-Tap Changer	118.25	93.5	18	1.25	ONLOAD	Manual				6	
DOB.TF.T12	DOB-TF-T12-On Load Tap Ch	118.25	93.5	18	1.25	ONLOAD	Manual				5	
EDG.TF.T5	EDG-TF-T5B-Tap Changer -- C	220	198	4	2.5	OFFLOAD						2
EDG.TF.T5	EDG-TF-T5R-Tap Changer -- C	220	198	4	2.5	OFFLOAD						2
EDG.TF.T5	EDG-TF-T5Y-Tap Changer -- C	220	198	4	2.5	OFFLOAD						2
EDG.TF.T5	EDG-TF-T5B-Tap Changer -- C	11.55	10.45	2	5	OFFLOAD						2
EDG.TF.T5	EDG-TF-T5R-Tap Changer -- C	11.55	10.45	2	5	OFFLOAD						2
EDG.TF.T5	EDG-TF-T5Y-Tap Changer -- C	11.55	10.45	2	5	OFFLOAD						2
GOR.TF.T11	GOR-TF-T11-Tap Changer	242	198	16	1.25	ONLOAD	Manual				5	
GOR.TF.T12	GOR-TF-T12-Tap Changer	242	198	16	1.25	ONLOAD	Manual				5	
HAM.TF.T6	HAM-TF-T6-Tap Changer -- O	242	198	16	1.25	ONLOAD	Manual				9	
HAM.TF.T9	HAM-TF-T9-Tap Changer -- O	242	198	16	1.25	ONLOAD	Manual				9	
HAY.TF.T1	HAY-TF-T1-Tap Changer -- OF	242	187	20	1.25	ONLOAD	Automatic	No				
HAY.TF.T1	HAY-TF-T1-Tap Changer -- OF	11.55	10.45	4	2.5	OFFLOAD						4
HAY.TF.T2	HAY-TF-T2-Tap Changer -- OF	242	187	20	1.25	ONLOAD	Automatic	No				
HAY.TF.T2	HAY-TF-T2-Tap Changer -- OF	11.55	10.45	4	2.5	OFFLOAD						4
HAY.TF.T5	HAY-TF-T5-Tap Changer -- OF	242	187	20	1.25	ONLOAD	Automatic	No				
HAY.TF.T5	HAY-TF-T5-Tap Changer -- OF	11.55	10.45	4	2.5	OFFLOAD						4
HEN.TF.T1	HEN-TF-T1B-Tap Changer -- C	231	198	12	1.25	ONLOAD	Manual				6	
HEN.TF.T1	HEN-TF-T1R-Tap Changer -- C	231	198	12	1.25	ONLOAD	Manual				6	
HEN.TF.T1	HEN-TF-T1Y-Tap Changer -- C	231	198	12	1.25	ONLOAD	Manual				6	
HEN.TF.T1	HEN-TF-T1B-Tap Changer -- C	11.55	10.45	4	2.5	OFFLOAD						5
HEN.TF.T1	HEN-TF-T1R-Tap Changer -- C	11.73	10.27	4	3.33	OFFLOAD						5

HEN.TF.T1	HEN-TF-T1Y-Tap Changer -- C	11.73	10.27	4	3.33 OFFLOAD			5
HEN.TF.T5	HEN-TF-T5B-Tap Changer -- C	231	198	12	1.25 ONLOAD	Manual		6
HEN.TF.T5	HEN-TF-T5R-Tap Changer -- C	231	198	12	1.25 ONLOAD	Manual		6
HEN.TF.T5	HEN-TF-T5Y-Tap Changer -- C	231	198	12	1.25 ONLOAD	Manual		6
HEN.TF.T5	HEN-TF-T5B-Tap Changer -- C	11.55	10.45	4	2.5 OFFLOAD			5
HEN.TF.T5	HEN-TF-T5R-Tap Changer -- C	11.55	10.45	4	2.5 OFFLOAD			5
HEN.TF.T5	HEN-TF-T5Y-Tap Changer -- C	11.55	10.45	4	2.5 OFFLOAD			5
HWB.TF.T6	HWB-TF-T6-Tap Changer	242	198	17	1.25 ONLOAD	Manual		6
INV.TF.T1	INV-TF-T1-Tap Changer	242	198	16	1.25 ONLOAD	Manual		7
ISL.TF.T3	ISL-TF-T3B-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual		5
ISL.TF.T3	ISL-TF-T3R-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual		5
ISL.TF.T3	ISL-TF-T3Y-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual		5
ISL.TF.T3	ISL-TF-T3B-Tap Changer -- OF	11.48	10.45	4	2.37 OFFLOAD			4
ISL.TF.T3	ISL-TF-T3R-Tap Changer -- OF	11.48	10.45	4	2.37 OFFLOAD			4
ISL.TF.T3	ISL-TF-T3Y-Tap Changer -- OF	11.48	10.45	4	2.37 OFFLOAD			4
ISL.TF.T6	ISL-TF-T6-Tap Changer -- ONI	240.02	194.26	16	1.3 ONLOAD	Manual		5
ISL.TF.T6	ISL-TF-T6-Tap Changer -- OFF	11.55	10.45	4	2.5 OFFLOAD			3
ISL.TF.T7	ISL-TF-T7B-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual		5
ISL.TF.T7	ISL-TF-T7R-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual		5
ISL.TF.T7	ISL-TF-T7Y-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual		5
ISL.TF.T7	ISL-TF-T7B-Tap Changer -- OF	11.48	10.45	4	2.37 OFFLOAD			4
ISL.TF.T7	ISL-TF-T7R-Tap Changer -- OF	11.48	10.45	4	2.37 OFFLOAD			3
ISL.TF.T7	ISL-TF-T7Y-Tap Changer -- OF	11.48	10.45	4	2.37 OFFLOAD			3
KAW.TF.T12	KAW-TF-T12-Tap Changer	242	198	16	1.25 ONLOAD	Manual		8
KAW.TF.T13	KAW-TF-T13-Tap Changer -- I	231	187	16	1.25 ONLOAD	Manual		8
KIK.TF.T1	KIK-TF-T1B-Tap Changer -- OI	220	198	4	2.5 OFFLOAD			1
KIK.TF.T1	KIK-TF-T1R-Tap Changer -- OI	220	198	4	2.5 OFFLOAD			1
KIK.TF.T1	KIK-TF-T1Y-Tap Changer -- OI	220	198	4	2.5 OFFLOAD			1
KIK.TF.T1	KIK-TF-T1B-Tap Changer -- OI	11.55	10.45	2	5 OFFLOAD			3
KIK.TF.T1	KIK-TF-T1R-Tap Changer -- OI	11.55	10.45	2	5 OFFLOAD			3
KIK.TF.T1	KIK-TF-T1Y-Tap Changer -- OI	11.55	10.45	2	5 OFFLOAD			3
KIK.TF.T2	KIK-TF-T2-Tap Changer	242	198	16	1.25 ONLOAD	Manual		8
KIK.TF.T2	KIK-TF-T2-Tap Changer -- OFF	11.55	10.45	5	2.5 OFFLOAD			3

KMO.TF.T2	KMO-TF-T2-Tap Changer	242	198	16	1.25 ONLOAD	Manual	7
KMO.TF.T4	KMO-TF-T4-Tap Changer	242	198	16	1.25 ONLOAD	Manual	7
MDN.TF.T5	MDN-TF-T5-Tap Changer -- C	242	198	17	1.25 ONLOAD	Manual	7
MDN.TF.T5	MDN-TF-T5-Tap Changer -- C	11.55	10.45	5	2.5 OFFLOAD		3
MDN.TF.T6	MDN-TF-T6-Tap Changer-ON	242	198	17	1.25 ONLOAD	Manual	7
MDN.TF.T6	MDN-TF-T6-Tap Changer -- C	11.55	10.45	5	2.5 OFFLOAD		3
OTA.TF.T3	OTA-TF-T3-Tap Changer -- OF	242	198	16	1.25 ONLOAD	Manual	8
OTA.TF.T3	OTA-TF-T3-Tap Changer -- OF	11.55	10.45	4	2.5 OFFLOAD		3
OTA.TF.T4	OTA-TF-T4-Tap Changer-Onl	242	198	16	1.25 ONLOAD	Manual	8
OTA.TF.T5	OTA-TF-T5-Tap Changer -- OF	242	198	16	1.25 ONLOAD	Manual	8
PEN.TF.T10	PEN-TF-T10-Tap Changer-On	242	198	16	1.25 ONLOAD	Manual	6
PEN.TF.T6	PEN-TF-T6-Tap Changer	242	187	20	1.25 ONLOAD	Manual	9
RDF.TF.T3	RDF-TF-T3-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual	6
RDF.TF.T4	RDF-TF-T4-Tap Changer -- ON	231	187	16	1.25 ONLOAD	Manual	6
ROX.TF.T10	ROX-TF-T10-Tap Changer	242	198	16	1.25 ONLOAD	Manual	7
SFD.TF.T10	SFD-TF-T10B-Tap Changer --	231	198	12	1.25 ONLOAD	Manual	5
SFD.TF.T10	SFD-TF-T10R-Tap Changer --	231	198	12	1.25 ONLOAD	Manual	5
SFD.TF.T10	SFD-TF-T10Y-Tap Changer --	231	198	12	1.25 ONLOAD	Manual	5
SFD.TF.T10	SFD-TF-T10B-Tap Changer --	11.55	10.45	2	5 OFFLOAD		2
SFD.TF.T10	SFD-TF-T10R-Tap Changer --	11.55	10.45	2	5 OFFLOAD		2
SFD.TF.T10	SFD-TF-T10Y-Tap Changer --	11.55	10.45	2	5 OFFLOAD		2
SFD.TF.T9	SFD-TF-T9-Tap Changer-Onlo	242	198	16	1.25 ONLOAD	Manual	6
STK.TF.T7	STK-TF-T7-Tap Changer	242	198	17	1.25 ONLOAD	Manual	9
STK.TF.T7	STK-TF-T7-Tap Changer -- OF	11.55	10.45	5	2.5 OFFLOAD		5
TIM.TF.T5	TIM-TF-T5-Tap Changer	242	198	16	1.25 ONLOAD	Manual	9
TIM.TF.T8A	TIM-TF-T8A-Tap Changer -- C	242	198	16	1.25 ONLOAD	Manual	12
TIM.TF.T8B	TIM-TF-T8B-Tap Changer -- C	242	198	16	1.25 ONLOAD	Manual	12
TRK.TF.T2	TRK-TF-T2-Tap Changer	242	198	16	1.25 ONLOAD	Manual	9
TRK.TF.T3	TRK-TF-T3-Tap Changer	242	198	16	1.25 ONLOAD	Manual	9
WIL.TF.T8	WIL-TF-T8-Tap Changer -- ON	242	187	20	1.25 ONLOAD	Manual	11
WPR.TF.T12	WPR-TF-T12-Tap Changer - T	236.5	187	18	1.25 ONLOAD	Automatic	No
WPR.TF.T13	WPR-TF-T13-Tap Changer - T	236.5	187	18	1.25 ONLOAD	Automatic	No
WTK.TF.T23	WTK-TF-T23B-Tap Changer --	220	198	4	2.5 OFFLOAD		2

WTK.TF.T23	WTK-TF-T23R-Tap Changer --	220	198	4	2.5 OFFLOAD	2
WTK.TF.T23	WTK-TF-T23Y-Tap Changer --	220	198	4	2.5 OFFLOAD	2
WTK.TF.T23	WTK-TF-T23B-Tap Changer --	11.55	10.45	2	5 OFFLOAD	2
WTK.TF.T23	WTK-TF-T23R-Tap Changer --	11.55	10.45	2	5 OFFLOAD	2
WTK.TF.T23	WTK-TF-T23Y-Tap Changer --	11.55	10.45	2	5 OFFLOAD	2
WTK.TF.T24	WTK-TF-T24B-Tap Changer --	220	198	4	2.5 OFFLOAD	2
WTK.TF.T24	WTK-TF-T24R-Tap Changer --	220	198	4	2.5 OFFLOAD	2
WTK.TF.T24	WTK-TF-T24Y-Tap Changer --	220	198	4	2.5 OFFLOAD	2
WTK.TF.T24	WTK-TF-T24B-Tap Changer --	11.55	10.45	2	5 OFFLOAD	2
WTK.TF.T24	WTK-TF-T24R-Tap Changer --	11.55	10.45	2	5 OFFLOAD	2
WTK.TF.T24	WTK-TF-T24Y-Tap Changer --	11.55	10.45	2	5 OFFLOAD	2

Branch	Overall 24 hour post contingency capacity rating						Continuous capacity		Resistive and Reactive Level of Positive Sequence Impedance		Resistive and Reactive Level of Zero Sequence Impedance		High voltage range that branch can operate over			Nominal HV	Nominal LV	Fault Current
	Summer		Winter				Resistance PU (100MVA)	Reactance PU (100MVA)	Resistance PU (100MVA)	Reactance PU (100MVA)	Maximum kV	Minimum kV	kV	HV Amp/sec	LV Amp/sec			
	Amps	MVA	Amps	MVA	Amps	MVA												
HAM.TF.T6	1407	268	1469	279.8	1155	220	0.0021364	0.0740909	0	-0.0491557	242	198	220	110 HAM	45600	43300		
HAM.TF.T9	1304	248.5	1362	259.5	1050	200	0.001111157	0.073527273	0.000347107	0.010334218	242	198	220	110 HAM	43300	45600		
KAW.TF.T1	252	96.2	263	100.4	210	80	0.00494	0.19989	0	0.199951	242	198	220	110 KAW	54600	29600		
OTA.TF.T5	1670	318.2	1745	332.4	1312	250	0.00068	0.05868	0	0.5431818	242	198	220	110 OTA	54600	43300		
RDF.TF.T3	514	98	546	104	446	85	0.00419	0.1009131	0	0.101	242	198	220	110 RDF	54600	45600		
RDF.TF.T4	514	98	546	104	446	85	0.00419	0.1009131	0	0.101	242	198	220	110 RDF	54600	45600		
TIM.TF.T8A	653	124.4	665	126.7	630	120	0.00433	0.1609333	0	0.1308314	242	198	220	110 TIM	54600	29600		
TIM.TF.T8B	641	122.1	668	127.2	630	120	0.0043683	0.1621667	0	0.1432203	242	198	220	110 TIM	69300	65800		
WPR.TF.T1:	925	105.7	967	110.6	700	80	0.0036	0.1567	0	0.1567413	242	198	220	66 WPR	43300	43300		
WPR.TF.T1:	925	105.7	967	110.6	700	80	0.0036	0.1567	0	0.1567413	242	198	220	66 WPR	43300	43300		

Interconnection asset and reliability report
(As required by EIPC, clause 12.27)

SCHEDULE G5: QUALITY OF SUPPLY: INTERCONNECTION ASSETS												Transpower	Disclosure Date	30 June 2023	Disclosure Year (year ended)	30 June 2023
<i>ref</i>																
5	G5(i): Interconnection Asset Report															
6	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7	Index Measures for Asset Category	CCT	110	1.67	0.07	0.08	0.5	0.28	10.45	None Apply	None Apply					
8	ARI-BOB-1	I	CCT	110	25.86	1.2	0	0	0	0	0	Y/Y	Planned Outage /			
9													13-SEP-2022: ARI-BOB-1 tripped, no A/R, blue phase to earth fault, cause unknown. A public places patrol from ARI to structure ARI-HAM-A0165 found no fault.	No Further Action		
10													02-OCT-2022: ARI-BOB-1 tripped, no A/R, red phase to earth fault, cause unknown. A full patrol from HAM-MER-A0009 to HAM-MER A0252 excluding cable section found no fault.	No Further Action	SN22166	
11													04-NOV-2022: ARI-BOB-1 tripped, no A/R, blue phase to earth fault, caused by third party (public). Private contractor operated hiab and was delivering building materials. Hiab operated within MAD of blue phase conductor in span S7-58 on HAM-MER-A. No damage to conductor, no injuries to hiab operator.	Safety presentation made to Hi-Ab company to educate operators about the risks of working near power lines.	SN22181	
12													14-MAR-2023: ARI-BOB-1 trip, no A/R, BPh-E fault, cause unknown, full line & public places patrol found no cause	No Further Action	SN22204	
13													07-APR-2023: ARI-BOB-1 (CB172 OPE, CB232 OPE) RFS as a contingency to avoid a N-1 voltage collapse in the Waikato region with only HAM T9 interconnecting transformer in service.	Readjustment during outage. A work order initiated for full alignment and service in Nov 2023.	SN23053	
14													01-JUN-2023: ARI-BOB-1 trip,no A/R, RPh-E fault, cause unknown, full line & public places patrol	Line maintenance contractor patrolled the line and nothing significant was found. Circuit was returned to service. No further action.	SN23067	
15													A forensic check of BOB-CB-322 was carried out to check the root cause of failure. Old assets stored as spares are checked for condition and documentation is provided prior to returning to spares.		SN23099	
16													17-JUN-2023: ARI-BOB-1 RFS for BOB-TF-T4 forced outage due to CB322 low energy and inoperative alarms		SN23102	
17													30-JUN-2023: ARI-BOB-1 trip,no A/R, BPh-E fault, cause unknown, full line & public places patrol	No Further Action	SN23119	
18	ARI-HAM-1	I	CCT	110	6.3	0.07	0	0	0	0	1	0	Planned Outage /			
19	ARI-HAM-2	I	CCT	110	5.89	0.07	0	0	0	0	3	0	Planned Outage /			
20	ARI-HTI-1	I	CCT	110	2.49	0	0	0	0	0	0	0	Planned Outage /			
21	ARI-HTI-ONG-1	I	CCT	110	2.05	0.06	0	0	0	0	1	0	Planned Outage /			
22	ARI-KIN-1	I	CCT	110	0.3	0.03	0	0	0	0	0	0	Planned Outage /			
23	ARI-KIN-2	I	CCT	110	0.99	0	0	0	0	0	2	0	N/N	Planned Outage /		
24	ATU-DOB-1	I	CCT	110	1	0	0	0	0	0	0	0	N/N	Planned Outage /		
25	ATU-RFN-IGH-1	I	CCT	110	2.82	0	0	0	0	0	1	1	Y/N	Planned Outage /		
26	BAL-GOR-1	B	CCT	110	4.63	0	0	0	0	0	0	0	Y/N	Planned Outage /		
27	BAL-HWB-1	B	CCT	110	6.57	0.32	0	0	0	0	4	0	Y/Y	Planned Outage /		
28													21-AUG-2022: BAL-BWK-HWB-1 tripped red phase to earth fault, for a flashover on the red phase moving arm of BWK- DS-186 caused by a bird steamer, LOC at BWK to Manawa Energy	Guano guards have been installed on all of the 110kV DS insulators at BWK to try and stop birds from causing flashovers.	SS22076	
29	BDE-EDN-1	B	CCT	110	1.58	0.03	0	0	0	0	0	0	N/N	Planned Outage /		
30	BDE-GOR-1	B	CCT	110	6.89	0	0	0	0	0	1	0	Y/N	Planned Outage /		
31	BLN-KIK-1	I	CCT	110	4.92	0	0	0	0	0	7	1	Y/N	Planned Outage /		
32	BLN-STK-1	I	CCT	110	0.86	0	0	0	0	0	4	0	N/N	Planned Outage /		
33	BLN-STK-2	I	CCT	110	1.88	0	0	0	0	0	3	0	Y/N	Planned Outage /		
34	BOB-HAM-1	I	CCT	110	26.47	0.24	0	0	0	0	0	0	Y/Y	Planned Outage /		
35													04-NOV-2022: BOB-HAM-1 RFS at the request of NCC due to violations on HAM-OHW-1, HEN-SWN-1, OTA-SWN-1, PAK-WKM-1 & 2, WHU-WKO-2 as a result of ARI-BOB-1 tripping	Safety presentation made to Hi-Ab company to educate operators about the risks of working near power lines.	SN22204	
36													27-JAN-2023: BOB-HAM-1 unavailable for service caused by broken insulator at structure HAM-MER-B0231. Prior to 1227 circuit was already open for system split for the duration of HLY_SFD_1 and BOB_214_227.	Risk based inspection of other insulators carried out. A number of insulator sets were replaced.	SN23010	

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7																
37														07-APR-2023: BOB-HAM-1 (CB292 OPE, CB172 OPE) RFS as a contingency to avoid a N-1 voltage collapse in the Waikato region with only HAM T9 interconnecting transformer in service.	Readjustment during outage. A work order initiated for full alignment and service in Nov 2023.	SN23067
38														30-JUN-2023: BOB-HAM-1 RFS, only BOB CB292 opened for a system split after ARI-BOB-1 trip	No Further Action	SN23119
39	BOB-HAM-2	I	CCT	110	0.55	0	0	0	0	0	1	0	N/N	Planned Outage /		
40	BOB-OTA-1	B	CCT	110	28.92	0	0	0	0	0	3	0	Y/N	Planned Outage /		
41	BPE-MTN-WGN-1	B	CCT	110	0.49	0	0	0	0	0	0	0	N/N	Planned Outage /		
42	BPE-MTN-WGN-2	B	CCT	110	0.34	0.01	0	0	0	0	0	0	N/N	Planned Outage /		
43	BPE-MTR-1	I	CCT	110	1.6	0.01	0	0	5	4.57	0	0	N/Y	11-JAN-2023: BPE-MTR-1 tripped, Yph-Bph-E fault, A/R disabled, probably caused by lightning. No patrol. LOS at MTR, NPK, ONG, OKN as there was a planned outage ARI-HTI-ONG-1 so BPE-MTR-1 was on N security	No further action	SN23002
44														19-APR-2023: BPE-MTR-1 tripped & A/R at BPE only, red phase to earth fault. The circuit was not patrolled, cause unknown	No further action	SN23073
45	BPE-WDV-1	I	CCT	110	0	0	0	0	0	0	0	0	N/N			
46	BPE-WDV-2	I	CCT	110	0.1	0	0	0	0	0	0	0	N/N	Planned Outage /		
47	CPK-WIL-1	B	CCT	110	1.93	0	0	0	0	0	0	0	Y/N	Planned Outage /		
48	CPK-WWD-WIL-2	B	CCT	110	0.97	0	0	0	0	0	3	0	N/N	Planned Outage /		
49	CPK-WWD-WIL-3	B	CCT	110	1.33	0	0	0	0	0	0	0	N/N	Planned Outage /		
50	CST-HUI-1	I	CCT	110	0.64	0	0	0	0	0	0	0	N/N	Planned Outage /		
51	CST-HUI-2	I	CCT	110	1.19	0	0	0	0	0	0	0	N/N	Planned Outage /		
52	CST-IRD-SFD-1	B	CCT	110	5.03	0	0	0	0	0	2	0	Y/N	Planned Outage /		
53	CST-MNI-1	I	CCT	110	0.72	0	0	0	0	0	1	0	N/N	Planned Outage /		
54	CST-NPL-1	I	CCT	110	14.69	0	0	0	0	0	0	0	Y/N	Planned Outage /		
55	CST-NPL-2	I	CCT	110	0	0	0	0	0	0	0	0	N/N			
56	CST-SFD-1	I	CCT	110	0	0	0	0	0	0	0	0	N/N			
57	CST-SFD-2	I	CCT	110	10.06	0	0	0	0	0	0	0	Y/N	Planned Outage /		
58	CST-SFD-3	I	CCT	110	11.37	0	0	0	0	0	0	0	Y/N	Planned Outage /		
59	DOB-RFN-IGH-2	I	CCT	110	3.19	0	0	0	0	0	3	0	Y/N	Planned Outage /		
60	EDG-KAW-1	I	CCT	110	0.29	0	0	0	0	0	1	0	N/N	Planned Outage /		
61	EDG-KAW-2	I	CCT	110	0.29	0	0	0	0	0	0	0	N/N	Planned Outage /		
62	EDG-OWH-2	B	CCT	110	3.58	0.01	0	0	0	0	2	1	Y/N	Planned Outage /		
63	EDN-INV-1	I	CCT	110	1.57	0	0	0	0	0	1	0	N/N	Planned Outage /		
64	FHL-RDF-1	I	CCT	110	0.21	37.45	0	0	0	0	3	0	N/Y	14-FEB-2023: FHL-RDF-1 RFS for restoration of supply via WPW already open at 0744 NZ trip	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
65	FHL-RDF-2	I	CCT	110	28.7	7.73	0	0	0	0	1	0	Y/Y	Planned Outage /		
66														14-FEB-2023: FHL-RDF-2 RFS for restoration of supply via WPW	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
67	FHL-TUI-1	I	CCT	110	0.38	1.78	0	0	1	22.74	3	0	N/Y	22-NOV-2022: FHL-TUI-1 trip, RDF-TUI-1&2 trip & A/R at RDF end only, caused by lightning. TUI islanded until all TUI generation tripped at 1730, LOS to Eastland Network Ltd at TUI	No further action, there is a capital project to upgrade protection and CBs at TUI (2026) which will help mitigate this scenario.	SN22222
68														03-OCT-2022: FHL-TUI-1 tripped & only TUI end A/R & tripped, red to yellow phase fault, caused by falling tree. Tree fell on two conductors in span TUI-BPE-A0221-0222, one conductor broke & fell to the ground.	Saturated ground trees to fall in the forest. Transpower obtained permission to fell trees threatening the lines. The forest owner agreed to prioritise the harvest of trees within 40m of the Transmission line. Wet weather has prevented the harvest. Corridor widening now planned for the coming summer. Ventia has produced a list of plantation forests and are in regular contact with tree owners to encourage the widening of tree corridors to allow safe operation of the lines.	SN22182
69														13-FEB-2023: FHL-TUI-1 tripped & A/R. Circuit remained closed for 4 seconds then tripped again with A/R lockout. Probably caused by conductors clashing with heavy rain and strong winds, patrol found no evidence of a fault.	Inspected line with helicopter and found no evidence of fault. Likely windblown material that was dislodged following second fault. No further action.	SN23025

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7																
70														14-FEB-2023: FHL-TUI-1 RFS for restoration of supply via WPW	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
71														25-JUN-2023: FHL-TUI-1 tripped for a red to yellow phase fault probably due to conductors clashing caused by heavy rain and moderate winds, no patrol	No further action.	SN23115
72	FHL-WPW-1	I	CCT	110	0.29	0.01	0	0	0	0	0	0	N/N	Planned Outage /		
73	FHL-WPW-2	I	CCT	110	0.58	0.14	0	0	2	14.23	0	0	N/Y	15-JUN-2023: WDV-DVK-WPW-2 trip, & FHL-WPW-2 tripped Yph-E faults, patrol cause unknown. LOS of 33kV @WPW	No further action.	SN23107
74														17-JAN-2023: FHL-WPW-2 trip Yph-E fault, cause unknown, patrol found no cause only bird activity around the two river crossings	No further action.	SN23005
75														14-FEB-2023: FHL-WPW-2 RFS for restoration of supply via WPW	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
76	GOR-ROX-1	I	CCT	110	3.86	0	0	0	0	0	1	0	Y/N	Planned Outage /		
77	HAM-KPO-1	I	CCT	110	2.25	0	0	0	0	0	1	0	Y/N	Planned Outage /		
78	HAM-KPO-2	I	CCT	110	0.12	0	0	0	0	0	0	0	N/N	Planned Outage /		
79	HAY-TKR-1	I	CCT	110	1.19	0	0	0	0	0	0	0	N/N	Planned Outage /		
80	HAY-TKR-2	I	CCT	110	1.74	0	0	0	0	0	1	0	Y/N	Planned Outage /		
81	HAY-UHT-1	I	CCT	110	0.91	0	0	0	0	0	0	0	N/N	Planned Outage /		
82	HAY-UHT-2	I	CCT	110	0.09	0	0	0	0	0	0	0	N/N	Planned Outage /		
83	HEN-HEP-1	I	CCT	110	0.12	0	0	0	0	0	0	0	N/N	Planned Outage /		
84	HEN-HEP-2	I	CCT	110	0	0	0	0	0	0	0	0	N/N			
85	HEN-HEP-3	I	CCT	110	0.91	0	0	0	0	0	0	0	N/N	Planned Outage /		
86	HEN-HEP-4	I	CCT	110	1.23	0	0	0	0	0	0	0	N/N	Planned Outage /		
87	HEN-MPE-1	I	CCT	110	5.34	30.73	0	0	0	0	3	0	Y/Y	Planned Outage /		
88														24-FEB-2023: HEN-WEL-1 and 2 RFS as slip at str 160.	This tower has been removed and a new line deviation has been commissioned.	SN23046
89	HEN-MPE-2	I	CCT	110	6.01	31.01	0	0	0	0	1	0	Y/Y	Planned Outage /		
90														14-FEB-2023: HEN-MPE-2 tripped & no A/R, blue phase to earth fault, patrol tree fell on circuit in span 6 to 7, patrol found conductor down. Trees were cleared trees. The bottom phase conductor was repaired.	All other fall distance trees adjacent to the one that fell have been removed. Additional fall distance tree felling in other places has been negotiated since Cyclone Gabrielle.	SN23039
91														24-FEB-2023: HEN-WEL-1 and 2 RFS as slip at str 160	This tower has been removed and a new line deviation has been commissioned.	SN23046
92	HEP-ROS-1	I	CCT	110	0.21	0	0	0	0	0	0	0	N/N	Planned Outage /		
93	HEP-ROS-2	I	CCT	110	0.48	0.03	0	0	0	0	0	0	N/N	Planned Outage /		
94	HOR-KBY-ISL-1	B	CCT	110	0.08	0	0	0	0	0	0	0	N/N	Planned Outage /		
95	HOR-KBY-ISL-2	B	CCT	110	0.64	0	0	0	0	0	0	0	N/N	Planned Outage /		
96	HUI-MNI-1	I	CCT	110	2.1	0.71	0	0	0	0	0	0	Y/Y	Planned Outage /		
97														31-MAR-2023: HUI CB-892 failed to close at the end of a planned outage to HUI-MNI-1. The closing latches were corroded and sticking and needed cleaning and lubrication. As the CB was operated more the closing timings improved however this is likely to deteriorate again before too long.	No further action.	SN23064
98	HWA-SFD-1	I	CCT	110	1.3	0	0	0	0	0	1	0	N/N	Planned Outage /		
99	HWA-WVY-1	I	CCT	110	2.48	0	0	0	0	0	0	0	Y/N	Planned Outage /		
100	HWB-ROX-1	I	CCT	110	4.09	0	0	0	0	0	2	0	Y/N	Planned Outage /		
101	HWB-ROX-2	I	CCT	110	3.74	0	0	0	0	0	2	0	Y/N	Planned Outage /		
102	IGH-KIK-1	I	CCT	110	6.39	0	1	6.78	0	0	2	1	Y/N	Planned Outage /		
103	IGH-KIK-2	B	CCT	110	2.36	0	0	0	0	0	1	0	Y/N	Planned Outage /		
104	IGH-ROB-1	B	CCT	110	3.62	0	0	0	0	0	0	0	Y/N	Planned Outage /		
105	IGH-ROB-2	B	CCT	110	2.05	0.01	0	0	0	0	0	0	Y/N	Planned Outage /		
106	KIK-STK-3	I	CCT	110	3.08	0	0	0	0	0	0	0	Y/N	Planned Outage /		
107	KIN-TRK-1	I	CCT	110	1.98	0.31	0	0	0	0	2	0	Y/Y	Planned Outage /		

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7																
108														13-FEB-2023: KIN-TRK-1 tripped for a high resistance red phase to earth fault. No A/R. LFD T1 inter-tripped. KIN-LFD-2 RFS at KIN CB352. Tripped on close at 1337 and 1709. Patrol found large branch broken from main leader on red phase conductor in span ARI-EDG-A0236-0237.	Tree cleared from line.	
109	KIN-TRK-2	I	CCT	110	3.11	0.3	0	0	0	0	2	0	Y/Y	Planned Outage /		SN23026
110														13-FEB-2023: KIN-LFD-2 section of KIN-TRK-2 RFS after KIN-TRK-1 trip for grid reconfiguration	Tree cleared from line.	
111	KMO-MTM-1	I	CCT	110	0.34	0	0	0	0	0	0	0	N/N	Planned Outage /		SN23026
112	KMO-MTM-TGA-2	B	CCT	110	2.5	0.07	0	0	2	60.86	0	0	Y/Y	Planned Outage /		
113														13-OCT-2022: TGA-110KV bus tripped for damaged insulator on DIS-237, total 33kV LOS at TGA to Powerco. Load backfed via KMO 33kV.	The birds nest was removed and bird proofing was added. Insulators were inspected and no signs of damage was found.	SN22199
114														31-OCT-2022: TGA-BS-110-204-227, KMO-MTM-TGA-2, TGA-CAP-C11,TGA-TF-T4 RFS birds nest above DS214	Screen installed to stop nesting	SN22201
115	KMO-TGA-1	B	CCT	110	0.59	0.02	0	0	2	60.86	0	0	N/Y	14-OCT-2022: PSO switching to RTS DS-237 and TGA-BS-110-287-247	The birds nest was removed and bird proofing was added. Insulators were inspected and no signs of damage was found.	SN22199
116	KMO-TMI-1	I	CCT	110	3.83	0.01	0	0	1	23.09	0	0	Y/Y	Planned Outage /		
117														01-MAR-2023: KMO-TMI1 tripped only at TMI CB132 via TMI relay 132Dist2 as VT137 supply removed when TMI DS137 opened during planned outage TMI-110-BS-137-144-154. Caused by human error, incorrect operating procedure, failed to isolate relay 132Dist2	The incident and learnings were reviewed. Event has been included as part of team training. Documentation for grid controllers and Protection Advice has been updated/corrected.	SN23048
118	KPO-TMU-1	I	CCT	110	5.08	0	0	0	0	0	0	0	Y/N	Planned Outage /		
119	MDN-MPE-1	I	CCT	110	0.29	0	0	0	0	0	0	0	N/N	Planned Outage /		
120	MDN-MPE-2	I	CCT	110	1.71	0	0	0	0	0	1	0	Y/N	Planned Outage /		
121	MGM-MST-1	I	CCT	110	1.04	0	0	0	0	0	1	0	N/N	Planned Outage /		
122	MGM-WDV-1	I	CCT	110	0.23	0	0	0	0	0	0	0	N/N	Planned Outage /		
123	MNG-OTA-1	I	CCT	110	1.19	0.02	0	0	0	0	0	0	N/N	Planned Outage /		
124	MNG-OTA-2	I	CCT	110	1.17	0	0	0	0	0	0	0	N/N	Planned Outage /		
125	MNG-ROS-1	I	CCT	110	1.69	0	0	0	0	0	0	0	Y/N	Planned Outage /		
126	MNG-ROS-2	I	CCT	110	2.75	0	0	0	0	0	0	0	Y/N	Planned Outage /		
127	MNI-MKE-SFD-1	B	CCT	110	4.77	0	0	0	0	0	2	0	Y/N	Planned Outage /		
128	MST-UHT-1	I	CCT	110	1.05	0	0	0	0	0	0	0	N/N	Planned Outage /		
129	MST-UHT-2	I	CCT	110	1.22	0	0	0	0	0	0	1	0	N/N	Planned Outage /	
130	MTR-OKN-1	I	CCT	110	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
131	OAM-BPT-WTK-1	B	CCT	110	1.18	0	1	22.52	0	0	0	0	Y/N	Planned Outage /		
132	OAM-STU-BPD-WTK-2	B	CCT	110	3.43	0	0	0	0	0	0	0	Y/N	Planned Outage /		
133	OKN-NPK-ONG-1	B	CCT	110	0.29	0	0	0	0	0	3	2	N/N	Planned Outage /		
134	OPK-SFD-1	B	CCT	110	3.41	0.02	0	0	0	0	0	0	Y/N	Planned Outage /		
135	OTA-PEN-2	I	CCT	110	1.4	0.03	0	0	0	0	0	0	N/N	Planned Outage /		
136	OTA-ROS-1	I	CCT	110	21.65	0	0	0	0	0	0	0	Y/N	Planned Outage /		
137	OTA-ROS-2	I	CCT	110	5.4	0	0	0	0	0	0	0	Y/N	Planned Outage /		
138	OTA-WIR-1	B	CCT	110	1.94	0	0	0	0	0	0	0	Y/N	Planned Outage /		
139	OTA-WIR-2	B	CCT	110	2.26	0	0	0	0	0	1	1	Y/N	Planned Outage /		
140	RDF-TUI-1	I	CCT	110	5.14	1.86	0	0	1	22.74	2	0	Y/Y	Planned Outage /		
141														22-NOV-2022: FHL-TUI-1 trip, RDF-TUI-1&2 trip & A/R at RDF end only, caused by lightning. TUI islanded until all TUI generation tripped at 1730, LOS to Eastland Network Ltd at TUI	No further action, there is a capital project to upgrade protection and CBs at TUI (2026) which will help mitigate this scenario.	SN22222
142														06-OCT-2022: RDF-TUI-1 trip & A/R, Bph-E, cause unknown. The circuit was not patrolled.	No further action	SN22186
143														10-DEC-2022: RDF-TUI-1 tripped, A/R, tripped. YPh-BPh fault. Circuit remained closed beyond A/R dead time so no SOTF. Cause unknown, circuit patrolled no fault found.	No further action	SN22232
144														Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.		
145	RDF-TUI-2	I	CCT	110	25.08	37.49	0	0	1	22.74	1	0	Y/Y	Planned Outage /		SN23037

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7																
146														22-NOV-2022: FHL-TUI-1 trip, RDF-TUI-1&2 trip & A/R at RDF end only, caused by lightning. TUI islanded until all TUI generation tripped at 1730, LOS to Eastland Network Ltd at TUI	No further action, there is a capital project to upgrade protection and CBs at TUI (2026) which will help mitigate this scenario.	SN22222
147														14-FEB-2023: RDF-TUI-2 trip & A/R @RDF only, B-E fault, strong winds Note NO TUI CB152 visibility due to comms. fault, CB found open at 0730 by Genesis, RDF CB42 opened at 0732 & cct left out and cont'd.on SN23037 at 0733	Evidence of tree strikes on circuit one was found following cyclone. May have also impacted circuit 2 but not caused damage. Critical trees were removed. Regularly meeting with forest owners seeking to maintain safe operating corridors.	SN23034
148														14-FEB-2023: RDF-TUI-2 RFS for restoration of supply via WPW, already out from SN23034. Assign this cct to SN23037 from 0733	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
149	STU-TIM-1	I	CCT	110	3.52	0	0	0	0	0	0	0	Y/N	Planned Outage /		
150	TKR-WIL-1	I	CCT	110	1.86	0	0	0	0	0	0	0	Y/N	Planned Outage /		
151	TKR-WIL-2	I	CCT	110	1.27	0	0	0	0	0	0	0	N/N	Planned Outage /		
152	TMI-OWH-TRK-1	B	CCT	110	7.2	0.12	0	0	0	0	4	1	Y/Y	Planned Outage /		
153														27-JAN-2023: OWH-TMI-TRK-1 tripped, A/R, tripped, caused by falling tree leader branch on span OKE-TMI-A0045-0046 due to the weather - strong winds	Tree cleared from line	SN23011
154	WDV-DVK-WPW-1	I	CCT	110	1.21	0.2	0	0	0	0	0	0	N/Y	11-OCT-2022: WDV-DVK-WPW-1 tripped for a red phase to earth fault cause unknown. WPW T2 & DVK T2 tripped for this circuit fault. A patrol of the circuit found no fault.	No further action.	SN22191
155														16-DEC-2022: WDV-DVK-WPW-1 tripped for a red phase to earth fault, cause unknown. WPW T2 & DVK T2 tripped for this circuit fault. No patrol of the circuit	No further action.	SN22236
156														01-JAN-2023: WDV-DVK-WPW-1 tripped for a red phase to earth fault, cause unknown. WPW T2 & DVK T2 tripped for this circuit fault. Patrol found no cause	No further action.	SN23001
157														14-FEB-2023: DVK-WDV-1 RFS for restoration of supply via WPW	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
158	WDV-DVK-WPW-2	I	CCT	110	1.63	0.08	0	0	2	14.23	0	0	N/Y	15-JUN-2023: WDV-DVK-WPW-2 tripped for a yellow phase to earth fault, cause unknown. LOS at WPW as T2 RFS for HB event.	No further action.	SN23107
159														14-FEB-2023: DVK-WDV-2 RFS for restoration of supply via WPW	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
160	WGN-WVY-1	I	CCT	110	2.12	0	0	0	0	0	0	0	Y/N	Planned Outage /		
161																
	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
162																
163	Index Measures for Asset Category		CCT	220	0.88	0.05	0	0	0.13	9.87	None Apply	None Apply				
164	ALB-HEN-3	I	CCT	220	2.23	0	0	0	0	0	0	0	Y/N	Planned Outage /		
165	ALB-HPI-1	B	CCT	220	1.36	0	0	0	0	0	0	0	Y/N	Planned Outage /		
166	ALB-SVL-2	B	CCT	220	2.42	0	0	0	0	0	0	0	Y/N	Planned Outage /		
167	ALB-WRD-4	I	CCT	220	0	0	0	0	0	0	0	0	N/N			
168	ASB-BRY-1	B	CCT	220	2.19	0	0	0	0	0	0	0	Y/N	Planned Outage /		
169	ASB-ISL-1	B	CCT	220	0.58	0	0	0	0	0	0	0	N/N	Planned Outage /		
170	ASB-TIM-TWZ-1	I	CCT	220	0.49	0	0	0	0	0	1	0	N/N	Planned Outage /		
171	ASB-TIM-TWZ-2	I	CCT	220	0.58	0	0	0	0	0	0	0	N/N	Planned Outage /		
172	ATI-OHK-1	I	CCT	220	2.33	0	0	0	0	0	1	0	Y/N	Planned Outage /		
173	ATI-TRK-1	I	CCT	220	1.13	0	0	0	0	0	0	0	Y/N	Planned Outage /		
174	ATI-TRK-2	I	CCT	220	1.11	0	0	0	0	0	0	0	Y/N	Planned Outage /		
175	ATI-WKM-1	I	CCT	220	0.84	0	0	0	0	0	0	0	N/N	Planned Outage /		
176	AVI-BEN-1	I	CCT	220	0.32	0	0	0	0	0	0	0	N/N	Planned Outage /		
177	AVI-BEN-2	I	CCT	220	1.2	0	0	0	0	0	0	0	Y/N	Planned Outage /		
178	AVI-WTK-1	I	CCT	220	0.09	0	0	0	0	0	0	0	N/N	Planned Outage /		

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7																
179	BEN-OHB-1	B	CCT	220	0.77	0	0	0	0	0	0	0	N/N	Planned Outage /		
180	BEN-OHC-2	B	CCT	220	0.09	0	0	0	0	0	0	0	N/N	Planned Outage /		
181	BEN-TWZ-1	I	CCT	220	0.18	0	0	0	0	0	1	0	N/N	Planned Outage /		
182	BPE-BRK-1	I	CCT	220	3.53	0	0	0	0	0	0	0	Y/N	Planned Outage /		
183	BPE-BRK-2	I	CCT	220	2.46	0	0	0	0	0	1	0	Y/N	Planned Outage /		
184	BPE-LTN-2	I	CCT	220	0.98	0	0	0	0	0	1	0	Y/N	Planned Outage /		
185	BPE-LTN-WIL-1	I	CCT	220	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
186	BPE-PRM-HAY-1	B	CCT	220	3.7	0	0	0	0	0	4	0	Y/N	Planned Outage /		
187	BPE-PRM-HAY-2	B	CCT	220	4.76	0	0	0	0	0	2	0	Y/N	Planned Outage /		
188	BPE-TKU-1	B	CCT	220	2.22	0	0	0	0	0	0	0	Y/N	Planned Outage /		
189	BPE-TKU-2	B	CCT	220	1.47	0.06	0	0	0	0	2	0	Y/Y	Planned Outage /		
190														18-MAR-2023: BPE-TKU-2 tripped, only at TKU CB62, on returning it to service after a planned outage. Incident caused by human error by operations (maintenance switcher) due to an error of action, remiss, as instruction to select CVT 62 VT isolation switch to service position was skipped.	Incident raised in Maximo Health Safety and Environment and an investigation undertaken, amended key management changes implemented.	SN23058
191	BPE-TNG-1	B	CCT	220	0.89	0	0	0	0	0	2	0	Y/N	Planned Outage /		
192	BPE-TWC-LTN-1	B	CCT	220	0.68	0	0	0	0	0	0	0	N/N	Planned Outage /		
193	BPE-WIL-1	I	CCT	220	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
194	BRB-HPI-1	B	CCT	220	5.79	0.17	0	0	0	0	0	0	Y/Y	Planned Outage /		
195														25-APR-2023: HEN-HPI-1 & BRB-HPI-1, HPI-BS-220-324-354 RFS for kite removal from HEN-HPI-1 YPh between towers 6 and 7	A forced outage was put in to remove a kite from the yellow phase conductor of HEN_HPI_1 and HPI 220kV bus section. This was caused by a member of the public. No further action.	SN23076
196	BRB-MDN-1	B	CCT	220	0.37	0	0	0	0	0	0	0	N/N	Planned Outage /		
197	BRK-SFD-1	I	CCT	220	2.38	0	0	0	0	0	1	0	Y/N	Planned Outage /		
198	BRK-SFD-2	I	CCT	220	2.87	0	0	0	0	0	2	0	Y/N	Planned Outage /		
199	BRK-SFD-3	I	CCT	220	2.71	0	0	0	0	0	0	0	Y/N	Planned Outage /		
200	BRY-ISL-1	B	CCT	220	1.11	0	0	0	0	0	0	0	Y/N	Planned Outage /		
201	CYD-CML-TWZ-1	I	CCT	220	3.73	0	0	0	0	0	0	0	Y/N	Planned Outage /		
202	CYD-CML-TWZ-2	I	CCT	220	3.23	0	0	0	0	0	0	0	Y/N	Planned Outage /		
203	CYD-ROX-1	I	CCT	220	1.2	0.13	0	0	0	0	0	0	Y/Y	Planned Outage /		
204														10-JUN-2023: CYD-ROX-1 trip-A/R-trip, A/R lockout, Yph & Bph fault, severe cold, possible clashing conductors due to snow unloading. Circuit patrol found no cause	No further action.	SS23049
205	CYD-ROX-2	I	CCT	220	1.19	0	0	0	0	0	2	0	Y/N	Planned Outage /		
206	DRY-BOB-HLY-1	B	CCT	220	5.28	0	0	0	0	0	0	0	Y/N	Planned Outage /		
207	DRY-BOB-HLY-2	B	CCT	220	3.9	0	0	0	0	0	0	0	Y/N	Planned Outage /		
208	DRY-OTA-1	B	CCT	220	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
209	DRY-TAK-OTA-1	B	CCT	220	1.29	0	0	0	0	0	0	0	Y/N	Planned Outage /		
210	DRY-TAK-OTA-2	B	CCT	220	1.18	0	0	0	0	0	0	0	Y/N	Planned Outage /		
211	EDG-KAW-3	I	CCT	220	0.96	0	0	0	0	0	2	0	Y/N	Planned Outage /		
212	EDG-TRK-1	I	CCT	220	2.2	0.32	0	0	0	0	1	0	Y/Y	Planned Outage /		
213														11-APR-2023: EDG-TRK-1 RFS to replace broken insulator and hardware on yellow phase jumper at strain tower 147.	Insulator replaced	SN23069
214	EDG-TRK-2	I	CCT	220	1.33	0	0	0	0	0	1	0	Y/N	Planned Outage /		
215	HAM-OHW-1	I	CCT	220	2.65	0	0	0	0	0	0	0	Y/N	Planned Outage /		
216	HAM-WKM-1	I	CCT	220	2.07	0	0	0	0	0	0	0	Y/N	Planned Outage /		
217	HAY-WIL-LTN-1	I	CCT	220	7.48	0	0	0	0	0	8	0	Y/N	Planned Outage /		
218	HAY-WIL-LTN-2	I	CCT	220	5.72	0	0	0	0	0	6	0	Y/N	Planned Outage /		
219	HEN-HPI-1	I	CCT	220	1.82	0.17	0	0	0	0	0	0	Y/Y	Planned Outage /		
220														25-APR-2023: HEN-HPI-1 & BRB-HPI-1, HPI-BS-220-324-354 RFS for kite removal from HEN-HPI-1 YPh between towers 6 and 7	A forced outage was put in to remove a kite from the yellow phase conductor of HEN_HPI_1 and HPI 220kV bus section. This was caused by a member of the public. No further action.	SN23076
221	HEN-OTA-1	I	CCT	220	3.29	0	0	0	0	0	0	0	Y/N	Planned Outage /		
222	HEN-SWN-1	I	CCT	220	2.67	0	0	0	0	0	0	0	Y/N	Planned Outage /		
223	HLY-OHW-1	I	CCT	220	0.39	0.01	0	0	0	0	0	0	N/N	Planned Outage /		
224	HLY-OHW-2	I	CCT	220	1.48	0.09	0	0	0	0	0	0	Y/Y	Planned Outage /		
225														21-MAR-2023: HLY-OHW-2 RFS to isolate faulty OHW DS316. Note 1/2 breaker CB232 already open at 0746 for planned work.	A temporary jumper was installed on yellow phase while waiting for arrival of spare parts to fix burnt out contacts. Each phase was serviced and tested. DIS 316 was returned to service.	SN23060

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT	
7																	
226														02-JUN-2023: OHW-CB-282 failed to close on RTS of HLY-OHW-2 from planned work, closing circuit contactor faulty. At 2300 circuit to voltage control but not RTS until 3/6/23 at 0634 from voltage control	A replacement contactor was sourced and the faulty contactor replaced and tested.		
227	HLY-OTA-2	B	CCT	220	3.19	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
228	HLY-SFD-1	I	CCT	220	2.82	0.23	0	0	0	0	0	0	0	Y/Y	Planned Outage /		
229														05-MAY-2023: HLY-SFD-1 forced outage after a planned outage as SFD DS586 failed to close. Adjustments were made to the control operating arm of SFD DS586 to close it.	No further action		
230	HLY-TWH-1	B	CCT	220	1.5	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
231	HOB-PEN-1	I	CCT	220	3.13	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
232	HOB-WRD-1	I	CCT	220	0.35	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
233	HPI-MDN-1	I	CCT	220	4.98	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
234	HRP-RDF-1	I	CCT	220	0	0	0	0	0	0	0	0	0	N/N			
235	HWP-TAB-1	I	CCT	220	0.06	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
236	HWB-SDN-1	B	CCT	220	0.62	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
237	HWB-TMH-1	B	CCT	220	1.85	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
238	INV-MAN-2	B	CCT	220	3.94	0.03	0	0	0	0	0	0	0	Y/N	Planned Outage /		
239	INV-NMA-1	B	CCT	220	0.65	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
240	INV-ROX-1	I	CCT	220	3.56	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
241	INV-ROX-2	I	CCT	220	2.39	0	0	0	0	0	0	3	0	Y/N	Planned Outage /		
242	INV-TWI-1	I	CCT	220	3.4	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
243	INV-TWI-2	I	CCT	220	2.49	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
244	ISL-KIK-1	I	CCT	220	3.64	0	0	0	0	0	0	1	0	Y/N	Planned Outage /		
245	ISL-LIV-1	I	CCT	220	1.09	0	0	0	0	0	0	8	0	Y/N	Planned Outage /		
246	ISL-NWD-1	I	CCT	220	0	0	0	0	0	0	0	0	0	N/N			
247	ISL-TKB-1	B	CCT	220	0	0	0	0	0	0	0	1	0	N/N			
248	ISL-WPR-CUL-KIK-2	B	CCT	220	2.79	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
249	ISL-WPR-CUL-KIK-3	B	CCT	220	0.69	0.26	0	0	0	0	0	0	0	N/Y	09-AUG-2022: ISL-WPR-CUL-KIK-3 tripped, A/R & tripped yellow phase to blue phase fault probably caused by snow loading on conductors. Conductors and insulators were drowned in snow	No further actions	
250	KAW-OHK-1	I	CCT	220	0.95	0	0	0	0	0	1	0	0	Y/N	Planned Outage /		
251	KIK-STK-1	I	CCT	220	0.35	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
252	KIK-STK-2	I	CCT	220	1.16	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
253	KMO-TRK-1	I	CCT	220	1.08	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
254	KMO-TRK-2	I	CCT	220	0.07	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
255	LIV-NSY-1	I	CCT	220	1.17	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
256	LIV-WTK-1	I	CCT	220	0	0	0	0	0	0	0	1	0	N/N			
257	MAN-NMA-1	B	CCT	220	3.38	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
258	MAN-NMA-2	B	CCT	220	2.56	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
259	MAN-NMA-3	B	CCT	220	3.02	0.03	0	0	0	0	0	0	0	Y/N	Planned Outage /		
260	NMA-GOR-TMH-1	I	CCT	220	3.28	1.58	0	0	0	0	0	2	0	Y/Y	Planned Outage /		
261														23-SEP-2022: NMA-GOR-TMH-1 delayed RTS caused by NMA-DS-836 fail to close at the end of a planned outage to NMH-GOR-TMH-1 & GOR-TF-111 for structure replacement.	No further action.		
262	NMA-GOR-TMH-2	I	CCT	220	2.38	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
263	NMA-TWI-1	B	CCT	220	3.57	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
264	NMA-TWI-2	B	CCT	220	2.14	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
265	NPL-SFD-1	I	CCT	220	0	0	0	0	0	0	0	0	0	N/N			
266	NPL-SFD-2	I	CCT	220	14.69	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
267	NSY-ROX-1	I	CCT	220	1.19	0.06	0	0	0	0	0	0	0	Y/Y	Planned Outage /		
268														24-SEP-2022: NSY-ROX-1 trip & A/R at ROX only red phase to earth fault, patrol of structures 167 to 237 found no cause	No further action.		
269														13-JAN-2023: NSY-ROX-1 trip & A/R at ROX only blue phase to earth fault, no patrol, cause unknown	No further actions		
270														07-FEB-2023: NSY-ROX-1 trip & A/R at ROX only red phase to earth fault, no patrol, no cause found	NSY end circuit breakers did not auto-reclose due to protection settings from Clutha Upper Waitaki Lines Project days. Settings changed in Mar2023.		
271	OHB-TWZ-3	B	CCT	220	1.07	0	0	0	0	0	0	0	0	Y/N	Planned Outage /		
272	OHC-TWZ-4	B	CCT	220	0.74	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
273	OHK-WRK-1	I	CCT	220	0.21	0	0	0	0	0	0	0	0	N/N	Planned Outage /		

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7	OHW-OTA-1	I	CCT	220	5.18	0	0	0	0	0	0	0	Y/N	Planned Outage /		
274	OHW-OTA-2	I	CCT	220	5.66	0.01	0	0	0	0	0	0	Y/N	Planned Outage /		
275	OHW-WKM-1	I	CCT	220	2.05	1.09	0	0	0	0	0	0	Y/Y	Planned Outage /		
276																
277														21-MAR-2023: OHW-WKM-1 RFS to isolate OHW-DS-316 to replace its yellow phase contacts which were melted	A temporary jumper was installed on yellow phase while waiting for arrival of spare parts to fix burnt out contacts. Each phase was serviced and tested. DIS 316 was returned to service.	
278	OTA-PAK-3	I	CCT	220	0.43	0	0	0	0	0	0	0	N/N	Planned Outage /		
279	OTA-PAK-4	I	CCT	220	0	0	0	0	0	0	0	0	N/N			
280	OTA-PEN-5	I	CCT	220	0.64	0	0	0	0	0	0	0	N/N	Planned Outage /		
281	OTA-PEN-6	I	CCT	220	11.79	0	0	0	0	0	0	0	Y/N	Planned Outage /		
282	OTA-SWN-1	I	CCT	220	2.52	0	0	0	0	0	0	0	Y/N	Planned Outage /		
283	OTA-WKM-1	I	CCT	220	13.97	0	0	0	0	0	8	0	Y/N	Planned Outage /		
284	OTA-WKM-2	I	CCT	220	14.17	0	0	0	0	0	4	0	Y/N	Planned Outage /		
285	PAK-PEN-3	I	CCT	220	0.66	0	0	0	0	0	0	0	N/N	Planned Outage /		
286	PAK-WKM-1	I	CCT	220	1.96	0	0	0	0	0	0	0	Y/N	Planned Outage /		
287	PAK-WKM-2	I	CCT	220	0	10.31	0	0	0	0	0	0	N/Y	01-JUL-2022: PAK-WKM-2 tripped, on closing PAK522, for a blue phase cable joint fault at bay 07-08 on BHL-PAK-B. Equipment failure caused this cable joint to fail. Patrolled cable section, no LOS.	Faulty joint replaced. Operating restrictions have been applied to circuits to mitigate further join failures.	
288	RDF-WHI-1	I	CCT	220	2.41	6.66	0	0	0	0	0	0	Y/Y	Planned Outage /		
289														14-FEB-2023: RDF flooded, RDF-WHI-1 tripped, major LOS (103MW) at RDF, FHL, WTU, TUI	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	
290	RDF-WRK-1	I	CCT	220	3.74	0	0	0	0	0	1	0	Y/N	Planned Outage /		
291	ROX-TMH-1	I	CCT	220	2.43	0	0	0	0	0	0	0	Y/N	Planned Outage /		
292	ROX-TMH-2	I	CCT	220	1.21	0	0	0	0	0	1	0	Y/N	Planned Outage /		
293	RPO-TNG-1	B	CCT	220	2.81	0.1	0	0	0	0	0	1	0	Planned Outage /		
294														14-FEB-2023: RPO-TNG-1 & RPO-WRK-1 tripped as circuits tied together via RPO bypass for RPO-BS-220-567-626-664 planned outage. Red phase to earth fault. Heavy rain and strong winds. LOC @ RPO to Genesis. Note G6 and RPO CB632 were already open. DTF values were inaccurate.	No further action	
295														14-FEB-2023: RPO-TNG-1 & RPO-WRK-1 tripped R-E fault caused by heavy rain and strong winds, cyclone Gabrielle. LOC @ RPO to Genesis. Note G6 and RPO CB632 open at time of trippings. Patrol found no exact cause	No further action	
296														03-MAR-2023: RPO-TNG-1 & RPO-WRK-1 tripped, only WRK CB152 A/R, Note RPO bypass (D5727) closed. R-E fault probably caused by lightning. LOC @ RPO to Genesis. Note G6 and RPO CB632 open at time of trippings. SDTF recorded lightning strikes in span BPE-WRK-A-0352-0353 at 1419.	No further action	
297														10-MAY-2023: RPO-TNG-1 & RPO-WRK-1 tripped, only WRK CB152 A/R, Note RPO bypass (D5727) closed. B-E fault probably caused by lightning. LOC @ RPO to Genesis. Note G5 and RPO CB532 open at time of trippings.	No further action	
298	RPO-WRK-1	B	CCT	220	2.92	0.11	0	0	0	0	1	0	Y/Y	Planned Outage /		
299														22-NOV-2022: RPO-WRK-1 tripped, no A/R, for a red phase to earth fault, probably caused by a lightning strike. SDTF recorded two lightning strikes at 1630:16 close to span 473 to 474 of BPE-WRK-A line. There was no patrol of the circuit	No further action	
300														14-FEB-2023: RPO-TNG-1 & RPO-WRK-1 tripped as circuits tied together via RPO bypass for RPO-BS-220-567-626-664 planned outage. Red phase to earth fault. Heavy rain and strong winds. LOC @ RPO to Genesis. Note G6 and RPO CB632 were already open. DTF values were inaccurate.	No further action	
301														14-FEB-2023: RPO-TNG-1 & RPO-WRK-1 tripped R-E fault caused by heavy rain and strong winds, cyclone Gabrielle. LOC @ RPO to Genesis. Note G6 and RPO CB632 open at time of trippings. Patrol found no exact cause	No further action	

		Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7	302																
303	SDN-TMH-1	B	CCT	220	1.18	0	0	0	0	0	0	0	0	Y/N	03-MAR-2023: RPO-TNG-1 & RPO-WRK-1 tripped R-E, probably caused by a lightning strike. LOC @ RPO to Genesis. Note G6 and RPO CB632 open at time of trippings. SDTF recorded lightning strikes in span BPE-WRK-A0352-0353 at 1419.	No further action	SN23049
304	SFD-TMN-1	I	CCT	220	0.66	0	0	0	0	0	0	1	0	N/N	Planned Outage /		
305	TAB-WRK-1	I	CCT	220	0.06	0.05	0	0	0	0	0	2	0	N/Y	15-FEB-2023: TAB-WRK-1 tripped and A/R then trip RPh-E, patrol found no cause	No further action	SN23040
306	THI-WKM-1	B	CCT	220	0.13	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
307	THI-WRK-1	B	CCT	220	0.23	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
308	TKB-TWZ-1	B	CCT	220	0.87	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
309	TKU-WKM-1	B	CCT	220	1.51	0	0	0	0	0	0	2	0	Y/N	Planned Outage /		
310	TKU-WKM-2	B	CCT	220	0.9	0	0	0	0	0	0	2	0	Y/N	Planned Outage /		
311	TMN-TWH-1	B	CCT	220	0.11	0	0	0	0	0	0	1	0	N/N	Planned Outage /		
312	WHI-WRK-1	I	CCT	220	1.22	6.02	0	0	0	0	0	0	0	Y/Y	Planned Outage /		
313															14-FEB-2023: RFS as WHI is flooded, RTS expected 23/2. Note WRK CB172 was opened on 14/2 at 1056. WHI CB512 opened on 15/2 at 0856 and closed on 18/2/23 at 0913	Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	SN23037
314	WKM-WRK-1	I	CCT	220	0.24	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
315																	
		Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
316	Index Measures for Asset Category		CCT	66	1.25	0.08	0.14	0.46	1.31	1.88	None Apply	None Apply					
317	ASY-SBK-1	B	CCT	66	0.66	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
318	ASY-WPR-1	B	CCT	66	0.09	0	0	0	0	0	1	0	0	N/N	Planned Outage /		
319	COL-HOR-2	I	CCT	66	0.11	0.06	0	0	0	0	1	0	0	N/N	Planned Outage /		
320		I	CCT	66	0.19	0.1	0	0	0	0	2	0	0	N/Y	11-MAY-2023: COL-HOR-3 tripped & A/R, for a red phase to earth fault, caused by fatigue failure of through bolt on bottom red phase cross-arm at structure COL-BKD-D0023. There was faulty design (incorrect bolt length specified) but exacerbated by faulty assembly (bolt not correctly tightened)	Failed bolt was removed and replaced with a new, longer bolt retained by two nuts tightened as lock nuts. Further structures have been checked for this issue.	SS23037
321	COL-HOR-3																
322	COL-OTI-1	I	CCT	66	13.14	0.43	0	0	2	0.63	11	18	Y/Y	Planned Outage /			
323															Snow arms installed on towers.		
324															31-JUL-2022: COL-OTI-1 tripped, permanent Yph-Bph fault to APS-CLH-1 circuit section, LOS at APS and CLH. Caused by a build up of snow or ice on conductors that clashed when ice or snow fell off.	SS22068	
325	COL-OTI-2	I	CCT	66	13.14	0.42	0	0	0	0	7	0	Y/Y	Planned Outage /			
326															21-JUL-2022: COL-OTI-2, CLH-COL-1 RFS as footing for structure COL-OTI-A0004 was subsiding. This structure was 10m from edge of a bank. Its a natural swale type of area that feeds stormwater into a waterway. No LOS at CLH or APS or OTI as cct1 was sectioned.	A new pole was installed as far away from the edge of the bank as possible. The foundation was concreted and compacted and was landscaped for future water runoff.	SS22063
327															21-JUL-2022: COL-OTI-2, CLH-COL-1 RFS as footing for structure COL-OTI-A0004 was subsiding. This structure was 10m from edge of a bank. Its a natural swale type of area that feeds stormwater into a waterway. The pole foundation was stabilised	A new pole was installed as far away from the edge of the bank as possible. The foundation was concreted and compacted and was landscaped for future water runoff.	SS22063
328															31-JUL-2022: COL-OTI-2 trip & A/R, trip RPh-YPh fault, probably caused by clashing conductors due to snow or ice loading. Circuit patrolled, heavy snow falls.	Snow arms installed on towers.	SS22069
329	DOB-GYM-1	I	CCT	66	0.35	0	0	0	0	0	0	0	0	N/N	Planned Outage /		
330	GYM-KUM-1	I	CCT	66	6.26	0.01	0	0	0	0	0	0	0	Y/N	Planned Outage /		
331	HKK-KUM-1	B	CCT	66	0.64	0.04	0	0	0	0	0	0	0	N/N	Planned Outage /		
332	HKK-OTI-2	B	CCT	66	2.43	0.18	0	0	1	2.24	0	0	0	Y/Y	Planned Outage /		

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7																
333														08-MAR-2023: HKK-OTI-2 tripped, Rph-Bph fault, probably caused by lightning. SDTF recorded a lightning strike at 2254:50 close to structure 325 on AHA-OTI-A line. LOS at HKK & KUM due to prior planned outage GYM-KUM-1	No further actions	
334														27-SEP-2022: HKK-OTI-2 tripped, Rph-E fault. Line patrol by helicopter of structures 225 to 444 found no cause	No further action	SS23020
335														24-NOV-2022: HKK-OTI-2 tripped, 3Ph-E fault, lightning. SDTF recorded a lightning strike at 0654:41 close to span 251 to 252 on AHA-OTI-A line. The circuit was patrolled from 173 to 316 after KUM-OTI-1 tripped on close of OTI 92. No cause found.	Landowner made aware of bark that caused tripping. No further actions.	SS22083
336														02-FEB-2023: HKK-OTI-2 tripped, Rph-YPh fault, line patrol found tree gum bark hanging down vertically between RPh & YPh in span 429 to 430 of AHA-OTI-A line. The debris was dislodged from the conductors	Gum bark was found hanging from red phase to yellow phase of the span. The bark debris was dislodged.	SS23015
337	ISL-SBK-1	I	CCT	66	0.93	0	0	0	0	0	0	0	N/N	Planned Outage /		
338	ISL-SBK-2	I	CCT	66	0.37	0	0	0	0	0	0	0	N/N	Planned Outage /		
339	KUM-OTI-1	B	CCT	66	0.89	0.07	0	0	1	0.04	0	0	N/N	Planned Outage /		
340														08-MAR-2023: HKK-OTI-2 & KUM-OTI-1 tripped, lightning, LOS at HKK & KUM due to planned outage GYM-KUM-1	No further actions	SS23020
341	SBK-WPR-1	I	CCT	66	0.4	0	0	0	0	0	0	0	N/N	Planned Outage /		
342																
	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
343																
344	Index Measures for Asset Category		Shunt	CAP_HV	0.81	1.33	0	0	0.02	0.03	None Apply	None Apply				
345	ALB-CAPS-C1	I	Shunt	CAP_HV	0	0	0	0	0	0	0	0	N/N			
346	ALB-CAPS-C2	I	Shunt	CAP_HV	0.46	0	0	0	0	0	0	0	N/N	Planned Outage /		
347	BOB-CAPS-C11	I	Shunt	CAP_HV	0	0	0	0	0	0	0	0	N/N			
348	HAM-CAPS-C1	I	Shunt	CAP_HV	0.91	0.04	0	0	0	0	0	0	Y/N	Planned Outage /		
349	HAM-CAPS-C2	I	Shunt	CAP_HV	12.52	0	0	0	0	0	0	0	Y/N	Planned Outage /		
350	HEN-CAPS-C1	I	Shunt	CAP_HV	1.2	0	0	0	0	0	0	0	Y/N	Planned Outage /		
351	HEP-CAPS-C11	I	Shunt	CAP_HV	0.81	0	0	0	0	0	0	0	N/N	Planned Outage /		
352	HEP-CAPS-C12	I	Shunt	CAP_HV	0.78	0	0	0	0	0	0	0	N/N	Planned Outage /		
353	HEP-CAPS-C13	I	Shunt	CAP_HV	0.11	0	0	0	0	0	0	0	N/N	Planned Outage /		
354	ISL-CAPS-C14	I	Shunt	CAP_HV	5.23	0	0	0	0	0	0	0	Y/N	Planned Outage /		
355	ISL-CAPS-C15	I	Shunt	CAP_HV	4.44	0.02	0	0	0	0	0	0	Y/N	Planned Outage /		
356	ISL-CAPS-C16	I	Shunt	CAP_HV	53.87	0	0	0	0	0	0	0	Y/N	Planned Outage /		
357	ISL-CAPS-C21	I	Shunt	CAP_HV	43.84	0	0	0	0	0	0	0	Y/N	Planned Outage /		
358	ISL-CAPS-C22	I	Shunt	CAP_HV	4.77	0	0	0	0	0	0	0	Y/N	Planned Outage /		
359	ISL-CAPS-C25	I	Shunt	CAP_HV	8.68	0	0	0	0	0	0	0	Y/N	Planned Outage /		
360	ISL-CAPS-C26	I	Shunt	CAP_HV	1.53	0	0	0	0	0	0	0	Y/N	Planned Outage /		
361	ISL-CAPS-C27	I	Shunt	CAP_HV	0.36	0	0	0	0	0	0	0	N/N	Planned Outage /		
362	MTM-CAPS-C1	I	Shunt	CAP_HV	6.09	0	0	0	0	0	0	0	Y/N	Planned Outage /		
363	NMA-CAPS-C1	I	Shunt	CAP_HV	0.07	0.08	0	0	0	0	0	0	N/N	Planned Outage /		
364	NMA-CAPS-C3	I	Shunt	CAP_HV	0.12	0	0	0	0	0	0	0	N/N	Planned Outage /		
365	OHW-CAPS-C1	I	Shunt	CAP_HV	0.05	0	0	0	0	0	0	0	N/N	Planned Outage /		
366	OHW-CAPS-C2	I	Shunt	CAP_HV	0.39	0.03	0	0	0	0	0	0	N/N	Planned Outage /		
367	OTA-CAPS-C11	I	Shunt	CAP_HV	4.25	0	0	0	0	0	0	0	Y/N	Planned Outage /		
368	OTA-CAPS-C12	I	Shunt	CAP_HV	4.16	0	0	0	0	0	0	0	Y/N	Planned Outage /		
369	OTA-CAPS-C29	I	Shunt	CAP_HV	4.97	0	0	0	0	0	0	0	Y/N	Planned Outage /		
370	OTA-CAPS-C30	I	Shunt	CAP_HV	0	100	0	0	0	0	0	0	N/Y	01-JUL-2022: OTA CB1422 C30 tripped on close, Castel key and resistor were replaced.	Castel key and resistor were replaced.	SN22132
371	OTA-CAPS-C31	I	Shunt	CAP_HV	0.27	0	0	0	0	0	0	0	N/N	Planned Outage /		
372	PEN-CAPS-C1	I	Shunt	CAP_HV	0.91	0	0	0	0	0	0	0	Y/N	Planned Outage /		
373	PEN-CAPS-C11	I	Shunt	CAP_HV	2.47	0	0	0	0	0	0	0	Y/N	Planned Outage /		
374	PEN-CAPS-C12	I	Shunt	CAP_HV	3.47	0	0	0	0	0	0	0	Y/N	Planned Outage /		
375	PEN-CAPS-C13	I	Shunt	CAP_HV	0	0	0	0	0	0	0	0	N/N			
376	PEN-CAPS-C14	I	Shunt	CAP_HV	0	0	0	0	0	0	0	0	N/N			
377	SBK-CAPS-C11	I	Shunt	CAP_HV	0.4	0	0	0	0	0	0	0	N/N	Planned Outage /		

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Uplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
7	TGA-CAPS-C11	I	Shunt	CAP_HV	0.38	0.05	0	0	0	0	0	0	N/N	Planned Outage /		
378	TMU-CAPS-C1	I	Shunt	CAP_HV	0	0	0	0	0	0	0	0	N/N			
379	TMU-CAPS-C2	I	Shunt	CAP_HV	0	0	0	0	0	0	0	0	N/N			
380																
381	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Uplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
382																
383	Index Measures for Asset Category		Shunt	CAP_LV	0.81	1.33	0	0	0.02	0.03	None Apply	None Apply				
384	BAL-CAPS-C1	I	Shunt	CAP_LV	0	0	0	0	0	0	0	0	N/N			
385	BAL-CAPS-C2	I	Shunt	CAP_LV	0	0	0	0	0	0	0	0	N/N			
386	BLN-CAPS-C1	I	Shunt	CAP_LV	0.1	0	0	0	0	0	0	0	N/N	Planned Outage /		
387	BLN-CAPS-C2	I	Shunt	CAP_LV	0.41	0	0	0	0	0	0	0	N/N	Planned Outage /		
388	BLN-CAPS-C3	I	Shunt	CAP_LV	1.05	0	0	0	0	0	0	0	Y/N	Planned Outage /		
389	BLN-CAPS-C4	I	Shunt	CAP_LV	0.8	0	0	0	0	0	0	0	N/N	Planned Outage /		
390	BRY-CAPS-C5A	I	Shunt	CAP_LV	1.58	0	0	0	0	0	2	0	Y/N	Planned Outage /		
391	BRY-CAPS-C6A	I	Shunt	CAP_LV	0	0	0	0	0	0	0	0	N/N			
392	GYM-CAPS-C1	I	Shunt	CAP_LV	0.36	0	0	0	0	0	0	0	N/N	Planned Outage /		
393	GYM-CAPS-C2	I	Shunt	CAP_LV	0.36	0	0	0	0	0	0	0	N/N	Planned Outage /		
394	GYM-CAPS-C3	I	Shunt	CAP_LV	0.36	0	0	0	0	0	0	0	N/N	Planned Outage /		
395	HKK-CAPS-C7	I	Shunt	CAP_LV	0.02	56.49	0	0	0	0	0	0	N/Y	06-DEC-2022: HKK-CAPS-C7,C8,C9 tripped when C8 put into service, found fault LB7	Waiting on manufacturer to send replacement parts. No further action.	SS22109
396		I	Shunt	CAP_LV	0.02	56.05	0	0	0	0	0	0	N/Y	08-DEC-2022: HKK-CAPS-C8 and C9 tripped when EC was adjusting the setting. Attempt RTS of HKK 1402 failed. Protection Flags: HKK CB 1402 - Trip Cct 1 & 2 Defect LB 8 faulty- CB Operation Failed	Waiting on manufacturer to send replacement parts. No further action.	SS22109
397	HKK-CAPS-C8	I	Shunt	CAP_LV	0.02	56.05	0	0	0	0	0	0	N/Y	08-DEC-2022: HKK-CAPS-C8 and C9 tripped when EC was adjusting the setting. Attempt RTS of HKK 1402 failed. Protection Flags: HKK CB 1402 - Trip Cct 1 & 2 Defect LB 8 faulty- CB Operation Failed	Waiting on manufacturer to send replacement parts. No further action.	SS22109
398	HKK-CAPS-C9	I	Shunt	CAP_LV	0.02	56.05	0	0	0	0	0	0	N/Y	08-DEC-2022: HKK-CAPS-C8 and C9 tripped when EC was adjusting the setting. Attempt RTS of HKK 1402 failed. Protection Flags: HKK CB 1402 - Trip Cct 1 & 2 Defect LB 8 faulty- CB Operation Failed	Waiting on manufacturer to send replacement parts. No further action.	SS22109
399	KTA-CAPS-C1	I	Shunt	CAP_LV	0	0	0	0	0	0	0	0	N/N			
400	ONG-CAPS-C1	I	Shunt	CAP_LV	1.4	0	0	0	0	0	0	0	Y/N	Planned Outage /		
401	STK-CAPS-C31	I	Shunt	CAP_LV	0.6	0	0	0	0	0	0	0	N/N	Planned Outage /		
402	STK-CAPS-C32	I	Shunt	CAP_LV	0.05	0	0	0	0	0	0	0	N/N	Planned Outage /		
403	STK-CAPS-C33	I	Shunt	CAP_LV	0.03	0	0	0	0	0	0	0	N/N	Planned Outage /		
404	STK-CAPS-C34	I	Shunt	CAP_LV	0.07	1.1	0	0	0	0	0	0	N/N	Planned Outage /		
405	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Uplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
406																
407	Index Measures for Asset Category		Shunt	Filter	1.03	1.71	0	0	0	0	None Apply	None Apply				
408	S1.20DB72-FB5	I	Shunt	Filter	0.33	0	0	0	0	0	0	0	N/N	Planned Outage /		
409	S1.20DB74-FB6	I	Shunt	Filter	0.9	0	0	0	0	0	0	0	N/N	Planned Outage /		
410	S1.20DB80-FB7	I	Shunt	Filter	0.62	0	0	0	0	0	0	0	N/N	Planned Outage /		
411	S1.WA-Z1.FB4	I	Shunt	Filter	1.26	0	0	0	0	0	0	0	Y/N	Planned Outage /		
412	S1.WA-Z2.FB3	I	Shunt	Filter	1.01	0	0	0	0	0	0	0	N/N	Planned Outage /		
413	S4.10DC96-FB6	I	Shunt	Filter	1.22	0	0	0	0	0	0	0	Y/N	Planned Outage /		
414	S4.10DC98-FB5	I	Shunt	Filter	1.17	0	0	0	0	0	0	0	Y/N	Planned Outage /		
415	S4.10DC98.A-FB5A	I	Shunt	Filter	0	0	0	0	0	0	0	0	N/N			
416	S4.10DC98.A-FB5B	I	Shunt	Filter	0	0	0	0	0	0	0	0	N/N			
417	S4.10E04-FB7	I	Shunt	Filter	1.36	0.05	0	0	0	0	0	0	Y/N	Planned Outage /		
418	S4.10E22-FB8	I	Shunt	Filter	0.68	0	0	0	0	0	0	0	N/N	Planned Outage /		
419	S4.WA-Z1.FB4	I	Shunt	Filter	2.86	0	0	0	0	0	0	0	Y/N	Planned Outage /		
420	S4.WA-Z1.Z1.FB4A	I	Shunt	Filter	0	0.09	0	0	0	0	0	0	N/N			
421	S4.WA-Z1.Z2.FB4B	I	Shunt	Filter	0.1	0.05	0	0	0	0	0	0	N/N	Planned Outage /		
422	S4.WA-Z2.FB3	I	Shunt	Filter	2.9	0	0	0	0	0	0	0	Y/N	Planned Outage /		
423	S4.WA-Z2.Z1.FB3A	I	Shunt	Filter	2.79	0	0	0	0	0	0	0	Y/N	Planned Outage /		
424	S4.WA-Z2.Z2.FB3B	I	Shunt	Filter	2.79	0	0	0	0	0	0	0	Y/N	Planned Outage /		

	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT	
7																	
456															Issue at the moment when 2b is in service and commission 1a there is an interference. Mitigation by commissioning sequence starting 1a before 2b. No further action at this time - will require significant design change and costs to resolve.	SS22111	
457															08-DEC-2022: KIK-STC-2B tripped on RTS of STC-2A, design issue fault	SS23031	
458															12-MAY-2023: KIK-STC-2A and STC 2B tripped for a cooling fault due to failure of UPS which stopped supplying power to the cooling pumps	SS23038	
459	MDN-STC-5	I	Shunt	SVC	1.6	5.6	0	0	0	0	0	0	Y/Y	Planned Outage /			
460															03-FEB-2023: MDN-STC-5 tripped, UPS power supply cabinet exploded. UPS was replaced	No further action.	
461															17-APR-2023: MDN-STC-5 tripped due to a fault on the STC controller- TDC rack. It was power cycled to clear fault	SN23020	
462	MDN-STC-6	I	Shunt	SVC	2.23	0.02	0	0	0	0	0	0	Y/N	Planned Outage /			
463	PEN-STC-1	I	Shunt	SVC	3.34	0	0	0	0	0	0	0	Y/N	Planned Outage /			
464	S4.10DB66-STC31	I	Shunt	SVC	0	0	0	0	0	0	0	0	N/N				
465	S4.10I01-STC31	I	Shunt	SVC	1.19	0	0	0	0	0	0	0	Y/N	Planned Outage /			
466																	
467	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT	
468	Index Measures for Asset Category		TF	110/066	2.25	0.02	0	0	0	0	None Apply	None Apply					
469	DOB-TF-T11	I	TF	110/066	2.52	0	0	0	0	0	3	0	Y/N	Planned Outage /			
470	DOB-TF-T12	I	TF	110/066	1	0	0	0	0	0	0	0	N/N	Planned Outage /			
471																	
472	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT	
473	Index Measures for Asset Category		TF	220/066	0.66	0.02	0	0	0	0	None Apply	None Apply					
474	ISL-TF-T3	I	TF	220/066	3.44	0.43	0	0	0	0	0	0	Y/Y	Planned Outage /			
475														18-MAR-2023: ISL-TF-T3 RFS for faulty tap changer, SVC-3 & ISL-BS 220-C RFS also. YPh unit later replaced with spare	Historical refurbishment defect - unit changed.		
476	ISL-TF-T6	I	TF	220/066	1.32	0.2	0	0	0	0	0	0	Y/Y	Planned Outage /		SS23022	
477														16-JUN-2023: ISL-CB-502 failed to close via SCADA on RTS of T6. POW relays was blocking the closing. Relays cycled and CB502 closed next day	No further action.	SS23053	
478	ISL-TF-T7	I	TF	220/066	6.14	0	0	0	0	0	0	0	Y/N	Planned Outage /			
479	WPR-TF-T12	I	TF	220/066	2.8	0	0	0	0	0	0	0	Y/N	Planned Outage /			
480	WPR-TF-T13	I	TF	220/066	0.69	0.26	0	0	0	0	0	0	Y/Y	Planned Outage /			
481														09-AUG-2022: WPR-TF-T13 tripped and A/R for ISL-WPR-CUL-KIK-3 fault	No further actions	SS22073	
482																	
483	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/Unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT	
484	Index Measures for Asset Category		TF	220/110	1.56	0.06	0.03	0.1	0.02	0.72	None Apply	None Apply					
485	BOB-TF-T4	I	TF	220/110	0.56	2.22	0	0	2	18.81	0	0	N/Y		A forensic check of BOB-CB-322 was carried out to check the root cause of failure. Old assets stored as spares are checked for condition and documentation is provided prior to returning to spares.	SN23102	

7	Asset	Type*	Asset Category	Sub Cat	Planned Unavailability %	Unplanned Unavailability %	Number Planned Interruptions	Planned Unserved Energy MWh	Number Unplanned Interruptions	Unplanned Unserved Energy MWh	Number of Outages <1 Min	Number of Interruptions <1 min	Measures Exceeded (plan/unplan) ?	Incidents Affecting Performance	Steps Being Taken To Improve Performance	IDENT
		I	TF	220/110	1.19	0	0	0	2	18.81	0	0	N/Y			
486	BOB-TF-T5													12-JUN-2023: BOB-CB-322 failed to open on BPh on RFS of T4. T5 tripped, LOS to CNP 110kV and 33kV	A forensic check of BOB-CB-322 was carried out to check the root cause of failure. Old assets stored as spares are checked for condition and documentation is provided prior to returning to spares.	
487	BPE-TF-T2	I	TF	220/110	0.07	0	0	0	0	0	0	0	N/N	Planned Outage /		SN2310
488	BPE-TF-T3	I	TF	220/110	0.3	0	0	0	0	0	0	0	N/N	Planned Outage /		
489	EDG-TF-T5	I	TF	220/110	1.13	0	0	0	0	0	0	0	N/N	Planned Outage /		
490	GOR-TF-T11	I	TF	220/110	6.74	1.58	0	0	0	0	2	0	Y/Y	Planned Outage /		
491														23-SEP-2022: GOR-TF-T11 delayed RTS caused by NMA-DS-836 fail to close at the end of a planned outage to NMH-GOR-TMH-1 & GOR-TF-T11 for structure replacement	No further action.	
492	GOR-TF-T12	I	TF	220/110	8.89	0	0	0	0	0	0	0	Y/N	Planned Outage /		SS2208
493	HAM-TF-T6	I	TF	220/110	0.02	0.08	0	0	0	0	0	0	N/Y	07-APR-2023: HAM-TF-T6 RFS to isolate and repair the damaged HAM-DS-484 as its red phase main contacts were arcing.	Readjustment during outage. A work order initiated for full alignment and service in Nov 2023.	SN2300
494	HAM-TF-T9	I	TF	220/110	0.39	0	0	0	0	0	0	0	N/N	Planned Outage /		
495	HAY-TF-T1	I	TF	220/110	0.76	0.05	0	0	0	0	0	0	N/N	Planned Outage /		
496	HAY-TF-T2	I	TF	220/110	0.67	0	0	0	0	0	0	0	N/N	Planned Outage /		
497	HAY-TF-T5	I	TF	220/110	1.07	0	0	0	0	0	0	0	N/N	Planned Outage /		
498	HEN-TF-T1	I	TF	220/110	8.34	0	0	0	0	0	0	0	Y/N	Planned Outage /		
499	HEN-TF-T5	I	TF	220/110	1.18	0.05	0	0	0	0	0	0	N/N	Planned Outage /		
500	HWB-TF-T6	I	TF	220/110	0.6	0	0	0	0	0	0	0	N/N	Planned Outage /		
501	INV-TF-T1	I	TF	220/110	1.57	0	0	0	0	0	1	0	Y/N	Planned Outage /		
502	KAW-TF-T12	I	TF	220/110	0.67	0	0	0	0	0	0	0	N/N	Planned Outage /		
503	KAW-TF-T13	I	TF	220/110	0.33	0	0	0	0	0	0	0	N/N	Planned Outage /		
504	KIK-TF-T1	B	TF	220/110	1.17	0	0	0	0	0	0	0	N/N	Planned Outage /		
505	KIK-TF-T2	B	TF	220/110	0	0	0	0	0	0	0	0	N/N			
506	KMO-TF-T2	I	TF	220/110	0.38	0	0	0	0	0	0	0	N/N	Planned Outage /		
507	KMO-TF-T4	I	TF	220/110	0.05	0	0	0	0	0	0	0	N/N	Planned Outage /		
508	MDN-TF-T5	I	TF	220/110	1.56	0.03	0	0	0	0	0	0	N/N	Planned Outage /		
509	MDN-TF-T6	I	TF	220/110	1.85	0	0	0	0	0	0	0	Y/N	Planned Outage /		
510	OTA-TF-T3	I	TF	220/110	0.66	0	0	0	0	0	0	0	N/N	Planned Outage /		
511	OTA-TF-T4	I	TF	220/110	0.18	0	0	0	0	0	0	0	N/N	Planned Outage /		
512	OTA-TF-T5	I	TF	220/110	0.93	0	0	0	0	0	0	0	N/N	Planned Outage /		
513	PEN-TF-T10	I	TF	220/110	54.28	0	0	0	0	0	0	0	Y/N	Planned Outage /		
514	PEN-TF-T6	I	TF	220/110	4.61	0	0	0	0	0	0	0	Y/N	Planned Outage /		
515	RDF-TF-T3	I	TF	220/110	5.16	13.6	0	0	0	0	0	0	Y/Y	Planned Outage /		
516															Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	
517	RDF-TF-T4	I	TF	220/110	6.24	6.67	0	0	0	0	0	0	Y/Y	Planned Outage /		SN2300
518															Silt removed. New, raised control room created. New protection panels installed. Primary equipment serviced.	
519	ROX-TF-T10	I	TF	220/110	0	0	0	0	0	0	0	0	N/N			
520	SFD-TF-T10	I	TF	220/110	0	0	0	0	0	0	0	0	N/N			
521	SFD-TF-T9	I	TF	220/110	0.35	0	0	0	0	0	0	0	N/N	Planned Outage /		
522	STK-TF-T7	I	TF	220/110	0	0	0	0	0	0	0	0	N/N			
523	TIM-TF-T5	I	TF	220/110	0.49	0	0	0	0	0	0	0	N/N	Planned Outage /		
524	TIM-TF-T8	I	TF	220/110	0.78	0	0	0	0	0	0	0	N/N	Planned Outage /		
525	TIM-TF-T8A	I	TF	220/110	0	0	0	0	0	0	0	0	N/N			
526	TIM-TF-T8B	I	TF	220/110	0	0	0	0	0	0	0	0	N/N			
527	TRK-TF-T2	I	TF	220/110	1.67	0	0	0	0	0	0	0	Y/N	Planned Outage /		
528	TRK-TF-T3	I	TF	220/110	1.45	0	0	0	0	0	0	0	N/N	Planned Outage /		
529	WIL-TF-T8	I	TF	220/110	1.25	0.04	0	0	0	0	0	0	N/N	Planned Outage /		
530	WTK-TF-T23	I	TF	220/110	1.16	0	0	0	0	0	0	0	N/N	Planned Outage /		
531	WTK-TF-T24	I	TF	220/110	1.18	0	1	22.52	0	0	0	0	Y/N	Planned Outage /		

OUTAGE PROTOCOL COMPLIANCE REPORT 2022-2023

Transpower New Zealand Limited
October 2023

Keeping the energy flowing



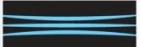
TRANSPOWER 

Table of Contents

Introduction	3
References and definitions	3
Compliance report.....	4
Preparation of the Outage Plan	4
Variations to the Outage Plan.....	5
Management of Outages	6
Appendix: Background Information and Data: 2022/2023.....	7
Table 1 Outage Summary	7
Table 2 Variations Summary	8



Introduction

This document is Transpower's annual Outage Protocol Compliance Report for the purposes of clause 10.1 of the Outage Protocol. It covers the outage plan year from 1 July 2022 to 30 June 2023.

During this time, we have sought to improve customer and interested participant understanding of our Outage Planning processes and to improve transparency of Transpower outages.

- We communicated the outage planning process during the Outage Planning Forum.
- We have invited and reminded customers and other interested parties to register with Transpower as interested participants to ensure we include them in our consultation and notification processes. These reminders have been through our website, during the Outage Planning Forum, and in discussions with customers and interested parties.
- We have continued to use lodged outages to provide participants early notification of proposed outages or outage changes.

Transpower remains committed to disclosing outage information to all participants as soon as practicable. This includes publishing the proposed and final outage plans, and any variations to ensure transparent disclosure and impartiality.

References and definitions

This report particularly references two outage planning documents. These are:

- Transpower's [Outage Planning Policy SP-OC-759](#) which clarifies how, in our dual roles as system operator and owner of the national grid, we meet our obligations around outage planning, coordination and assessment.
- Transpower's internal process document Outage Planning Process (GL-OP-1024) which reflects the Outage Protocol requirements.

In this report, terms and abbreviations used are those defined in the Outage Protocol or Part 1 of the Electricity Industry Participation Code 2010 (whichever applies). All clauses, unless otherwise noted, refer to the [Outage Protocol](#).

Transpower has updated our internal Outage Planning process documentation, to replace TP.MQ 45.03 with a number of new documents specific to tasks in the outage planning process. Some of these new documents are referenced in this report.

Compliance report

This section sets out Transpower's compliance with the Outage Protocol, by clause. The appendix provides background data and information about outage types.

Preparation of the Outage Plan

Clause 3 details what must be included in the Outage Plan, the development process and associated timeframes, as well as the required consultation process and subsequent Outage Plan publication.

In the 2022/2023 outage plan year:

- Transpower developed its outage plan based on its internal process document PR-OP-1022, which Transpower follows to ensure reasonably foreseeable outages are contained in the outage plan.
- Transpower published its proposed outage plan for the 2022/2023 outage plan year before 31 January 2022.
- Transpower discussed the proposed outage plan with each designated transmission customer and interested participant on an individual basis after the proposed plan was published, and before 31 March 2022.
- The Transpower outage planning forum was held 16 March 2022 in Transpower Wellington head office, with many participants joining virtually from their own locations or other Transpower offices.

Transpower published a copy of the outage plan on the Transpower website on 13 May 2022.

<https://www.transpower.co.nz/our-work/industry/our-grid/outage-planning>

Outage Plan Timeline

Clause	Outcome required	Date Complete
3.2.3	Proposed plan published	27 January 2022
3.2.4 (d)	Regional forums held	16 March 2022
3.3.2	Determine the content and publish the plan ¹ for the next outage plan year	Outages approved 13 May 2022 Outage Plan published on website 13 May 2022

¹ Outages approved in IONS, are uploaded and published to POCP within an hour.



Variations to the Outage Plan

Clauses 4 to 7 set out the process for designated transmission customers, interested participants and Transpower to make variations to the Outage Plan.

In the 2022/2023 outage plan year Transpower complied with Clauses 4 to 7 as follows:

- The outage plan was updated regularly to take account of variations to planned outages on both interconnection and connection assets.
- Transpower updated outages to the Planned Outage Coordination Process (POCP) website on an hourly basis, including any variations for connection or interconnection assets and short notice variations. Information on planned outages was also published to the Transpower website.
- The 5-minute timing of the IONS/SOS interface enables frequent update of outage information in IONS for any short-notice/forced outages as well as any real-time outage status updates. This provides more accurate outage information during the hourly updates to POCP.
- Transpower² sent out Asset Variation Notifications to those parties registered against the connection and interconnection assets, including the affected designated transmission customers, as soon as variations were processed.
- Transpower reconsidered outages pursuant to clause 6. Refer Appendix: Table 2 Variation Summary for more data.
- In relation to short notice connection and interconnection asset variations, Transpower followed its internal escalation process which requires that decisions on such variations comply with the reasons and requirements of clauses 4.3.4, 7.3.1 and 7.5.1.
- In relation to the reasons for carrying out short notice variations, Transpower's standard notice complies with the timeframes in clauses 7.3.2 and 7.5.2, and content requirements of clauses 7.3.3 and 7.5.3.
- Agreement was reached with all designated transmission customers who requested connection asset variations and therefore the requirements of clause 4.2.1(f) have not applied.
- There were four representations made this year for Transpower to apply the net benefit principle in accordance with Appendix A in order to determine whether the connection or interconnection asset variation should be undertaken by Transpower³. Subsequent discussions with the parties involved resulted in a satisfactory outcome removing the requirement for net benefit test (NBT) to be undertaken.
- Any outages undertaken pursuant to clause 7.6 require completion of an Outage Variation Request form which must then be considered by internal management prior to a decision to proceed.

² Transpower has a database containing the participants who have notified Transpower that they wish to be registered in respect of specified interconnection assets.

³ Clause 7.4 of the Outage Protocol

Management of Outages

Clause 8 sets out the expectations and co-ordination requirements associated with undertaking planned outages.

Clause 9 deals with the management of unpredicted, short notice or urgent outages.

In the 2022/2023 outage plan year Transpower complied with Clauses 8 and 9 by following Transpower's internal process document GL-OP-1024:

- to ensure outages were completed in accordance with the outage plan, that communication has been timely and clear, and that co-ordination was aligned with Clause 8.2.
- to consider requests for unplanned outages and ensure the requirements of clause 9.1.3 and the reasons for unplanned outages in clause 9.2.1 are met.

The following internal procedures and policy documents are also used to govern the process for managing unplanned outages and reflect the requirements of clause 9.3:

- GL-OP-1024 Transpower Outage Planning Process
- SP-OC-759 Outage Planning Policy
- PR-OP-1022 Create Annual Outage Plan
- PR-OP-1017 Request Change to Outage Plan
- PR-OP-1018 Resolve Request to Reconsider Outage
- GL-DP-008 Guideline for Internal Communication during an Event or Incident
- PR-DP-050 Demand Priority Lists and Customer Contact Details
- PR-DP-212 Manage an Island Following an Unplanned Event
- PR-DP-231 Manage a System Event (including a Grid Emergency)
- PR-DP-257 Manage Demand
- PR-AO-709 Emergency Operating Procedures
- GL-AO-661 Reporting by the National Grid Operations Centre

Transpower takes all practicable steps to give as much advance notice as possible of unplanned outages, but this is not always feasible because the urgent nature of unplanned outages does not permit formal advice through normal notification channels⁴.

⁴ Unplanned outages, whether entered in IONS by the Outage Planners or into SOS (SCADA Outage Scheduler) by the NGOC operator in real time, are updated hourly to POCP.

Appendix: Background Information and Data: 2022/2023

Table 1 Outage Summary

Number	Type	Further Detail
6255	Planned Outages for all work types in the 2022/2023 Year	<p>The total number of outages (outage windows) for 2022/2023 including OPEs, CLOs and PSOs but not forced outages.</p> <ul style="list-style-type: none"> • OPE – Open request, a request submitted to provide an open point on the system in association with planned work. • CLO – Close, request submitted to close a normally open point in association with planned work. • PSO – Power System Operating switching associated with planned work e.g. stepping into a bus to remove a transformer or circuit.
1996	Annual Plan <i>Remove from Service</i> outages published for the 2022/2023 Year	Number of removed from service outages that were included in the published annual outage plan for 2022/2023
1278	Additional <i>Remove from Service</i> planned outage windows in the 2022/2023 Year	Additional removed from service outages added in IONS via the OVR process.
3274	Total <i>Remove from Service</i> planned outage windows in the 2022/2023 Year	Published removed from service outages plus the additional removed from service outages for 2022/2023
511	<i>Remove from Service</i> outage windows moved during the 2022/2023 Year	All approved removed from service outages that were <u>moved or changed</u> in that FY i.e. outage where the start and/or end dates were changed
1864	<i>Remove from Service</i> outage windows cancelled during the 2022/2023 Year	All approved removed from service outages that were <u>cancelled</u> during the 2022/2023 year
808	<i>Remove from Service</i> unplanned outages during the 2022/2023 Year	Those outages entered by the NGOC operator into SOS in real time.

Table 2 Variations Summary

Variations made to the Outage Plan in the 2022/2023 year for the reasons detailed below.

Reason	15 Days Out	15-40 Days Out	>40 Days Out
Commissioning Works	0	0	1
Connected Party request	342	292	179
Insufficient Resources	0	1	7
Maintenance	60	205	389
Other	8	1	12
Project Works	68	90	836
System Security	18	22	16