AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Transfer Limit Advice – NEM Oscillatory Stability

April 2020

For the National Electricity Market

Important notice

PURPOSE

AEMO has prepared this document in accordance with the Power System Stability Guidelines to advise Registered Participants of the oscillatory stability limits in the National Electricity Market, as at the date of publication.

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VERSION CONTROL

Version	Release date	Changes
5	20/04/2020	Added limits for single element prior outages including Armidale-Dumaresq line, Armidale-Tamworth line, Heywood-South East line, Sapphire – Dumaresq line, Sapphire-Armidale line, Dumaresq-Bulli Creek line, Millmerran-Middle Ridge line, Calvale-Halys line, Braemar-Halys line, Braemar-Bulli Creek line, Braemar 275/330 kV transformer, Greenbank SVC, Southpine SVC, Blackwall SVC. Update to use AEMO's latest document template.
4	23/07/2018	Added limits for Black Range series capacitors in and out of service and for multiple prior outages.
3	31/01/2017	Updated for Black Range series capacitors commissioning. Updated limits for Victoria to SA system normal and outages of Para SVC, two Para SVCs, Para SVC POD and Black Range series capacitors. Removed limits for South Pine SVC, Greenbank SVC, South East to Tailem Bend line and Murray to Lower Tumut line.
2	23/03/2016	Converted to new AEMO template. Updated for third transformer at Heywood limits (both outage and system normal), added outage of both Para SVCs.
1	09/07/2013	Initial version

Contents

Tables

1. Introduction

AEMO is responsible for calculating the maximum oscillatory stability limits (into and out of a region) in the National Electricity Market (NEM) in accordance with Power System Stability Guidelines[1]. This document describes the values for these transfer limits for both system normal and outage conditions.

This limits advice document also describes the methodology used by AEMO to determine the oscillatory stability limits. AEMO is currently moving to a new methodology for calculating the limits. This methodology (described in section 1.3) increases the accuracy and consistency of the oscillatory stability limits and makes the calculation more consistent with the methods used to determine transient and voltage stability limits. Both methods are consistent with the Power System Stability Guidelines.

AEMO is updating all oscillatory stability limits to use this new methodology. All of the Victoria to South Australia limits have been updated in this version of the document. The Queensland to New South Wales limits will be updated after the work on updating the Victoria to South Australia limits is completed (planned to start early/mid-2018).

1.1 Other AEMO publications

Other limit advice documents are located at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Congestion-information/Limits-advice

1.2 Calculating oscillatory stability limits

In the NEM, AEMO is responsible for calculating the inter-regional oscillatory stability transfer limits in consultation with Transmission Network Service Providers (TNSPs). This involves coordinating inter-network power system tests, whenever required as defined by Clause 5.7.7 of the NER, with each jurisdictional planning representative. For example, tests are required to verify the performance of the power system when a new or augmented interconnector is established.

1.3 Methodology

The methodology AEMO is now using to calculate oscillatory stability limits is similar to that used by AEMO and TNSPs to calculate voltage and transient stability limits:

1. Calibrate the Mudpack simulation models with historic results from the oscillatory stability monitor (OSM).
2. Assessment to determine worst-case contingencies.
3. Development of a binary search algorithm to search for limiting interconnector power transfer.
4. Extrapolation method for limit studies where system damping has not reached the damping criteria for oscillatory instability at the end of binary search.
5. Linear regression and statistical limit determination.

AEMO will use this new methodology for all future oscillatory stability limit calculations. In this version of the limit advice, it is only used for the Victoria to South Australia oscillatory stability limits.

1.3.1 Replacement of previous methodology

AEMO is currently performing the studies to calculate the Victoria to South Australia oscillatory stability limits for commissioning of the Heywood upgrade (which are series capacitors at Black Range in South Australia). When that work is completed, the Queensland to New South Wales limits will be updated to use the new

[1] AEMO, *Power System Stability Guidelines*, Available at: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Congestion-information,Viewed on 31 August 2016.

methodology. The Queensland to New South Wales limits in this document use the old methodology presented below:

- Examine and compare historic Oscillatory Stability Monitor (OSM) damping results.
- Select appropriate OSM measurement data and Operations and Planning Data Management System (OPDMS) snapshots.
- Align results from simulations (MUDPACK) with results from OSM measurements.
- Perform sensitivity studies to determine the relationship between the changes in interconnector power transfer and the change in power system damping performance.
- Develop empirical equations to describe system damping performance versus interconnector power transfer and perform check studies for both system normal and contingencies.
- Apply assessment criteria as defined by S5.1a.3 and S5.1.8 of the NER to determine the feasibility of increasing the transfer limit.

1.4 Conversion to Constraint Equations

This document does not describe how AEMO implements these limit equations as constraint equations in the NEM market systems. That is covered in the Constraint Formulation Guidelines, Constraint Naming Guidelines and Constraint Implementation Guidelines. These documents are located in the Congestion Information Resource on the AEMO website:

http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Congestion-information

2. System Normal

The values below are to be applied under system normal conditions with the Phasorpoint real time oscillatory stability monitoring system available.

Table 1 System Normal limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	650 MW
South Australia to Victoria (Heywood + Murraylink)	800 MW
Victoria to South Australia (Heywood)	700 MW
Victoria to South Australia (Heywood + Murraylink)	920 MW
New South Wales to Victoria	1900 MW
Queensland to New South Wales on the Queensland to New South Wales Interconnector (QNI) only	1200 MW

Table 2 System Normal limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	550 MW
South Australia to Victoria (Heywood + Murraylink)	700 MW
Victoria to South Australia (Heywood)	570 MW
Victoria to South Australia (Heywood + Murraylink)	790 MW

3. Single plant outages

3.1 Phasorpoint Real Time Oscillatory Stability Monitoring System

Table 3 Phasorpoint Real Time Oscillatory Stability Monitoring System outage limits

Inter-regional flow	Limit
New South Wales to Victoria	1700 MW
Queensland to New South Wales (QNI only)	1078 MW

The following limits are to be applied in addition to the ones in Table 3 depending on the status of the Black Range series capacitors in South Australia.

Table 4 Phasorpoint Real Time Oscillatory Stability Monitoring System outage limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	550 MW
South Australia to Victoria (Heywood + Murraylink)	700 MW
Victoria to South Australia (Heywood)	570 MW
Victoria to South Australia (Heywood + Murraylink)	790 MW

Table 5 Phasorpoint Real Time Oscillatory Stability Monitoring System outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	460 MW
South Australia to Victoria (Heywood + Murraylink)	580 MW

The above limits are applied if AEMO's real time oscillatory stability monitoring system (Phasorpoint) or all the phasor measurement units (PMUs) are out of service/unavailable. For outages of some PMUs, the following limits apply:

Table 6 PMU outage limits

PMU Outage	Inter-regional flow	Limit
• (Para OR Sydney West), AND • Greenbank, AND • South Pine	Queensland to New South Wales (QNI only)	1078 MW
	New South Wales to Victoria	1700 MW
• Para AND • (Rowville OR Sydney West), AND • Greenbank, AND • South Pine	South Australia to Victoria (Heywood + Murraylink)	580 MW
	New South Wales to Victoria	1700 MW

3.2 Armidale to Dumaresq line 330 kV line

Table 7 Armidale to Dumaresq outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	760 MW

The following limits are to be applied in addition to the ones in Table 7 depending on the status of the Black Range series capacitors in South Australia.

Table 8 Armidale to Dumaresq outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW
Victoria to South Australia (Heywood)	560 MW
Victoria to South Australia (Heywood + Murraylink)	780 MW

With both Black Range series capacitors in service the system normal limits (see section 2) apply.

3.3 Armidale to Tamworth line 330 kV line

Table 9 Armidale to Tamworth outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	960 MW

3.4 Blackwall SVC

Table 10 Blackwall SVC outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1160 MW

Table 11 Blackwall SVC outage limits with Phasorpoint monitoring not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.5 Braemar 275/330 kV transformer

Table 12 Braemar 275/330 kV transformer outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1160 MW

Table 13 Braemar 275/330 kV transformer outage limits with Phasorpoint monitoring not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.6 Braemar to Halys/Tarong 275 kV line

Table 14 Braemar to Halys/Tarong outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.7 Braemar to Bulli Creek 330 kV line

Table 15 Braemar to Bulli Creek outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1160 MW

Table 16 Braemar to Bulli Creek outage limits when Phasorpoint monitoring is not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.8 Bulli Creek to Dumaresq 330 kV line

Table 17 Bulli Creek to Dumaresq outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	790 MW

The following limits are to be applied in addition to the ones in Table 18 depending on the status of the Black Range series capacitors in South Australia.

Table 18 Bulli Creek to Dumaresq outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW
Victoria to South Australia (Heywood)	550 MW
Victoria to South Australia (Heywood + Murraylink)	770 MW
Queensland to New South Wales (QNI only)	1078 MW

With both Black Range series capacitors in service the system normal limits (see section 2) apply.

3.9 Calvale to Halys/Tarong 275 kV line

Table 19 Calvale to Halys/Tarong outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1110 MW

Table 20 Calvale to Halys/Tarong outage limits when Phasorpoint monitoring is not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.10 Dederang to Murray 330 kV line

Table 21 Dederang to Murray outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.11 Greenbank SVC

Table 22 Greenbank SVC outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1150MW

Table 23 Greenbank SVC outage limits with Phasorpoint monitoring not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

For Victoria to South Australia and South Australia to Victoria limits the system normal values in section 2 apply.

3.12 Heywood to South East 275 kV line

Table 24 Heywood to South East outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1100 MW

Table 25 Heywood to South East outage limits with Phasorpoint monitoring not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.13 Millmerran to Middle Ridge 330 kV line

Table 26 Millmerran to Middle Ridge outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.14 Mortlake to Heywood or Macarthur to Heywood 500 kV line

Table 27 Mortlake to Heywood or Macarthur to Heywood outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.15 Murray to Upper Tumut 330 kV line

Table 28 Murray to Upper Tumut outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

Table 29 Murray to Upper Tumut outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	510 MW
South Australia to Victoria (Heywood + Murraylink)	660 MW
Victoria to South Australia (Heywood)	560 MW
Victoria to South Australia (Heywood + Murraylink)	780 MW
Queensland to New South Wales (QNI only)	1078 MW

With both Black Range series capacitors in service the system normal limits (see section 2) apply.

3.16 One Para SVC

Table 30 Para SVC outage limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	420 MW
South Australia to Victoria (Heywood + Murraylink)	570 MW

For Victoria to South Australia transfers the system normal values in section 2 apply.

Table 31 Para SVC outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	270 MW
South Australia to Victoria (Heywood + Murraylink)	420 MW
Victoria to South Australia (Heywood)	550 MW
Victoria to South Australia (Heywood + Murraylink)	770 MW

3.17 One Para SVC POD

Table 32 Para SVC POD outage limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	600 MW
South Australia to Victoria (Heywood + Murraylink)	750 MW

For Victoria to South Australia transfers the system normal values in section 2 apply.

Table 33 Para SVC POD outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	420 MW
South Australia to Victoria (Heywood + Murraylink)	570 MW
Victoria to South Australia (Heywood)	550 MW
Victoria to South Australia (Heywood + Murraylink)	770 MW

3.18 Sapphire to Dumaresq 330 kV line

Table 34 Sapphire to Dumaresq outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	760 MW

3.19 Sapphire to Armidale 330 kV line

Table 35 Sapphire to Armidale outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	760 MW

3.20 South East to Tailem Bend 275 kV line

Table 36 South East to Tailem Bend outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

3.21 South Pine SVC

Table 37 South Pine or Greenbank SVC outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1150 MW

Table 38 Southpine SVC outage limits with Phasorpoint monitoring not available

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	1078 MW

For Victoria to South Australia and South Australia to Victoria transfers the system normal values in section 2 apply.

3.22 South Pine, Greenbank or Blackwall SVC POD

Table 39 South Pine, Greenbank or Blackwall SVC POD outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	950 MW

4. Multiple Outages

4.1 Both Black Range series capacitors

Table 40 Black Range series caps outage limits

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	550 MW
South Australia to Victoria (Heywood + Murraylink)	700 MW
Victoria to South Australia (Heywood)	570 MW
Victoria to South Australia (Heywood + Murraylink)	790 MW

4.2 Both Black Range series capacitors and Phasorpoint Real Time Oscillatory Stability Monitoring System

Table 41 Black Range series caps and Phasorpoint Real Time Oscillatory Stability Monitoring System outage limits

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	460 MW
South Australia to Victoria (Heywood + Murraylink)	580 MW
Victoria to South Australia (Heywood)	460 MW
Victoria to South Australia (Heywood + Murraylink)	680 MW

4.3 Murray to Upper Tumut (65) and Murray to Lower Tumut (66) 330 kV lines

Table 42 Murray to Upper Tumut and Murray to Lower Tumut outage limits

Inter-regional flow	Limit
South Australia to Victoria (Heywood + Murraylink)	420MW

4.4 Murray to Upper Tumut (65) and Murray to Lower Tumut (66) 330 kV lines and Buronga to Red Cliffs 220 (OX1) kV line

Table 43 Murray to Upper Tumut and Murray to Lower Tumut and Buronga to Red Cliffs outage limits

Inter-regional flow	Limit
South Australia to Victoria (Heywood + Murraylink)	500 MW

4.5 Both Para SVCs

Table 44 Both Para SVCs out of service limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	310 MW
South Australia to Victoria (Heywood + Murraylink)	460 MW

For Victoria to South Australia transfers the system normal values in section 2 apply.

Table 45 Para SVC outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	230 MW
South Australia to Victoria (Heywood + Murraylink)	380 MW
Victoria to South Australia (Heywood)	525 MW
Victoria to South Australia (Heywood + Murraylink)	745 MW

4.6 One Para SVC and the POD of the other Para SVC

Table 46 One Para SVC and the POD of the other Para SVC out of service limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	230 MW
South Australia to Victoria (Heywood + Murraylink)	380 MW

For Victoria to South Australia transfers the system normal values in section 2 apply.

4.7 Para SVC 1 and 2 PODs

Table 47 Para SVC 1 and 2 PODs outage limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	540 MW
South Australia to Victoria (Heywood + Murraylink)	690 MW

For Victoria to South Australia transfers the system normal values in section 2 apply.

Table 48 Para SVC 1 and 2 PODs outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	230 MW
South Australia to Victoria (Heywood + Murraylink)	380 MW
Victoria to South Australia (Heywood)	525 MW

Inter-regional flow	Limit
Victoria to South Australia (Heywood + Murraylink)	745 MW

4.8 South Pine, Greenbank and Blackwall SVCs or PODs

Table 49 South Pine, Greenbank and Blackwall SVCs or PODs outage limits

Inter-regional flow	Limit
Queensland to New South Wales (QNI only)	853 MW

4.9 Dederang – Murray 330 kV line and Buronga-Red Cliffs 220 kV line

Table 50 Dederang - Murray 330 kV line and Buronga – Red Cliffs 220 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.10 Dederang – Murray 330 kV line and Buronga – Darlington Point 220 kV line

Table 51 Dederang - Murray 330 kV line and Buronga – Darlington Point 220 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.11 Murray – Upper Tumut 330 kV line and Lower Tumut – Upper Tumut 330 kV line

Table 52 Murray – Upper Tumut 330 kV line and Lower Tumut – Upper Tumut 330 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.12 Murray – Dederang 330 kV line and Murray – Upper Tumut 330 kV line

Table 53 Murray – Dederang 330 kV line and Murray – Upper Tumut 330 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.13 Marulan - Yass 330 kV line and Canberra – Yass 330 kV line

Table 54 Marulan - Yass 330 kV line and Canberra - Yass 330 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.14 Canberra – Yass 330 kV line and Upper Tumut – Yass 330 kV line

Table 55 Canberra - Yass 330 kV line and Upper Tumut – Yass 330 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.15 Dederang – South Morang 330 kV line and Dederang – Mount Beauty 220 kV line

Table 56 Dederang – South Morang 330 kV line and Dederang – Mount Beauty 220 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.16 Dederang – South Morang 330 kV line and Eildon – Mount Beauty 220 kV line

Table 57 Dederang – South Morang 330 kV line and Eildon – Mount Beauty 220 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.17 Dumaresq – Bulli Creek 330 kV line and Braemar – Bulli Creek 330 kV line

Table 58 Dumaresq – Bulli Creek 330 kV line and Braemar – Bulli Creek 330 kV line outage limits with both Black Range series capacitors in service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	530 MW
South Australia to Victoria (Heywood + Murraylink)	680 MW

Table 59 Dumaresq – Bulli Creek 330 kV line and Braemar – Bulli Creek 330 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	450 MW
South Australia to Victoria (Heywood + Murraylink)	600 MW

System normal limits in section 2 apply for Victoria to South Australia transfers.

4.18 Para – Robertstown 275 kV line and Robertstown - Tungkillo 275 kV line

Table 60 Para – Robertston 275 kV line and Robertstown – Tungkillo 275 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	480 MW
South Australia to Victoria (Heywood + Murraylink)	630 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

4.19 Murray - Dederang 330 kV line and Murray – Lower Tumut 330 kV line

Table 61 Murray - Dederang 330 kV line and Murray – Lower Tumut 330 kV line outage limits with one or both Black Range series capacitors out of service

Inter-regional flow	Limit
South Australia to Victoria (Heywood only)	500 MW
South Australia to Victoria (Heywood + Murraylink)	650 MW

System normal limits in section 2 apply for South Australia to Victoria transfers when both Black Range series capacitors are in service and for all Victoria to South Australia transfers.

MEASURES AND ABBREVIATIONS

Units of measure

Abbreviation	Unit of measure
MW	A Megawatt is one million watts. A watt (W) is a measure of power and is defined as one joule per second and it measures the rate of energy conversion or transfer.

Abbreviations

Abbreviation	Expanded name
Constraint equation	These are the mathematical representations that AEMO uses to model power system limitations and FCAS requirements in the National Electricity Market Dispatch Engine (NEMDE).
Mudpack	Oscillatory stability simulation software used by AEMO.
OPDMS	Operations and Planning Data Management System. This is a database used by AEMO and TNSPs. It stores power system snapshots on a half hourly basis.
OSM	Oscillatory Stability Monitor. This application uses the PMU data for planning and model calibration purposes.
Phasorpoint	Application which analyses the PMU data to monitor oscillatory stability in real-time.
PMU	Phasor measurement unit. Used by AEMO to monitor the oscillatory stability in the NEM.
System normal	The configuration of the power system where: • All transmission elements are in service, or • The network is operating in its normal network configuration.
TNSP	Transmission Network Service Provider