Information to be included in NSP LBSPs (excluding DC Links)

All fields in the applicable sections must be filled out. Do not use this template for DC Links – a separate template applies.

Section 0: LBSP version Information

The following information is to be provided using the table below or equivalent company sheet.

Version:	
Release Date:	
Approver:	

Section 1: General information

Item	Information required	Include the information in this column
1A	Registered name of the NSP	
1B	Primary and backup contact for matters relating to local black system procedures[1]:	<table><tr><td></td><td>Primary Contact</td><td>Secondary Contact</td></tr><tr><td>Name</td><td></td><td></td></tr><tr><td>Position</td><td></td><td></td></tr><tr><td>Phone</td><td></td><td></td></tr><tr><td>Email</td><td></td><td></td></tr></table>
1C	Is the NSP a party to an energy support arrangement (refer to the Rules definition)?	Yes / No (If yes, include all relevant information in section 8)
1D	Number of primary control centres and locations	
1E	Number of back up control centres (or disaster recovery sites) and locations	
1F	What is the minimum number of power system operators that the NSP will roster on a single shift?	

[1] This field is seeking contact details for personnel that provide and update LBSP information. Any updates to contact details for operational staff e.g. control room personnel or traders, are to be provided to the following email: supporthub@aemo.com.au.

Section 2: Operational capability of control centres following the failure of primary supplies for an extended period

Item	Information required	Include the information in this column
2A	Are the primary control centres capable of continued unrestricted operation following an extended supply failure? If the answer is No, indicate the estimated time duration/s for which the primary control centre/s can maintain the operational capability.	
2B	Estimated time required for the back up control centre/s to be operational	
2C	Indicate the estimated time duration/s for which the back up control centre/s can maintain their operational capability.	
2D	Include a summary of emergency supplies available at primary and back up control centre/s. Indicate the likely consequence of loss of back up supply to control centres.	

Section 3: Voice communication systems

Item	Information required	Include the information in this column
3A	List the different voice communication systems (normal and emergency) available to the operations group of the NSP If satellite phones are available to the operations group, include the phone numbers and locations. Please specify whether these are fixed installations with external antennas or portable satellite phones. For each of these systems, list the external organisations whose operational departments have access to these voice communication systems. Also nominate whether each of these systems can be used to contact the NSP field staff who may be required to switch in substations.	
3B	Estimated time duration these communications systems can be relied upon in the event of an extended interruption to primary supplies	

3C	Are these communication systems independent or do they rely on services provided by other parties? e.g. Telstra, Optus, government, or satellite phone service providers	
3D	Include a high level summary of routine testing arrangements for voice communication systems.	

Section 4: Continuity of NSP supervisory systems (monitoring and control)

Item	Information required	Include the information in this column
4A	Provide a high level summary of the different real time monitoring and control systems that are available during normal operation of your network and how they are used, including but not limited to: • SCADA • PMUs (synchrophasors or measurement systems) • Systems to monitor communication system integrity/availability for operation of your network.	
4B	Include a high level summary of routine testing arrangements for the supervisory, monitoring & control (SCADA, PMUs) systems.	
4C	Estimated time duration that the supervisory, monitoring and control systems (SCADA, PMUs) can reliably function in the event of an extended interruption to primary power supply. Also include the capability of emergency power supplies at control centres and data centres (associated with monitoring and control systems of your network).	
4D	Are your monitoring and control capabilities fully duplicated across more than one geographic location? If so, do all substation remote terminal units (RTU) communicate with each of these locations? Are other sources of real time network data available at each of these locations (e.g. visibility of PMUs)? Are there any other single points of failure which could affect these services (e.g.: single power supplies, single comms paths)	

Section 5: Continuity of substation operational capability

Item	Information required	Include the information in this column
5A	Indicate the arrangements for emergency supplies of 500kV, 330kV, 275kV, 220kV, 132kV, 110kV and 66kV substations. If the emergency supplies for some of the substations are different to the common arrangement for substations operating at the same voltage, list such substations and the differences.	
5B	Indicate the estimated time durations the substations can maintain operational capability (i.e. operation of circuit breakers including via SCADA etc.) following an extended interruption to primary supplies. In your response, please note any hydraulic circuit breakers in your network that may open following a loss of hydraulic pressure arising from a loss of auxiliary supplies.	
5C	Indicate the estimated time durations the RTUs of substations are likely to function following an extended interruption to primary supplies.	
5D	Indicate the time available before telemetry systems will begin to fail between • substation RTU's and the primary SCADA servers. • data centres, PMUs etc	

Section 6: Relevant technical information for restarting the network

Item	Information required	Include the information in this column
6A	Provide a list of locations where synchronising facilities are available within the network and at connection points of NSP's network. Indicate the circuit breakers that can be used for synchronising and whether the synchronising capability is local or remote. For each of these circuit breakers, specify the required synchronising angle between the running and line voltage for successful operation.	

Item	Information required	Include the information in this column
	How long will it will take to synchronise using these relays (indicative time for urban and country areas will be sufficient)? For example, the following may need to be considered: • command pulse extension relays • manual bypass of faulty synch check relays etc If this information is available in a quality assured procedure, document or a diagram, reference of that procedure, document or the diagram is sufficient.	
6B	Indicate circuit breakers where "check synchronising" and other "checks" are used before manually initiated closing operations. Also indicate whether the bypassing of these checks for these circuit breakers are local or remote. If the circuit breaker operations are checked before closing, please specify what process is applied to manually operate each circuit breaker either locally/remote in your network (incl. check synchronising).	
6C	Indicate any technical limitations or requirements specific to your network configuration that you are aware of, that should be taken into account in restoring supply within your network. Example: • Can any dynamic reactive plant be returned to service in the very early stages of the restoration following a black system? • Are there any known restoration sequences that should be avoided to minimise the risk of possible problems such as undesirable levels of harmonics?	
6D	Are there any location specific (i.e. at 500 kV, 330 kV, 275 kV, 220 kV, 132 kV, 110 kV and 66 kV substations) technical limitations or requirements that should be taken into consideration in restoring supply within your network.	
6E	Provide a detailed step-by-step procedure that corresponds to the	

Item	Information required	Include the information in this column
	system restart plan as applicable to your network. Please include the proposed switching sequence, to be attached to the LBSP (refer to LBSP Guidelines for more information).	
6F	Are there any other technical limitations or requirements that should be taken into consideration in restoring supply within your network following a major supply failure?	

Section 7: Specific requirements of time critical major customer loads

Item	Information required	Include the information in this column
7A	List the most significant time critical customer loads and the connection points (substations) of these loads directly supplied from your network. Indicate why it is critical to restore these loads within specific time frames. Indicate the MW consumption and critical timeframe for each of the loads.	
7B	Indicate any special characteristics of these loads that should be taken into consideration in developing restoration procedures.	

Section 8: Operating arrangements between TNSPs, DNSPs and Generators

Item	Information required	Include the information in this column ~~(~~
8A	If the NSP is party to an energy support arrangement (refer to Rule definition), include all the relevant details that could have an impact on restoration of supply within your network following a major supply ~~failure~~disruption, including but not limited to: • Identity of the facility to be supported, and if relevant any specific plant to be supported within the facility. • Maximum timeframe to restart/energise the facility following a major supply disruption and any interim stages/timeframes.	

Item	Information required	Include the information in this column ~~{~~
	• Detailed NSP switching sequences/procedures to be undertaken following a major supply disruption under this arrangement.	
8B	Do you have any operational/network support arrangements in place with Generators (under connection agreements or otherwise) requiring a generating system in this network to start or operate in a particular manner following a major supply disruption? If yes, please include relevant details such as, but not limited to: • Details of the generating system and purpose of the arrangement (e.g. supplying local load when islanded, black start service). • Timeframes within which support is to be provided following a major supply disruption/islanding. • Detailed NSP switching sequences/procedures to be undertaken following a major supply disruption/islanding under this arrangement.	
8C~~B~~	Include a high level summary of interface operating arrangements between TNSPs and DNSPs or between MNSPs and TNSPs to liaise progressive restoration of the power system following a major supply failure.	
8D~~C~~	TNSPs: Indicate whether there are existing protocols requiring TNSP to operate/switch certain DNSP or MNSP owned network equipment in normal operation as well as in emergencies. If the answer is 'Yes', briefly indicate in generic terms the locations/areas/voltages at which the protocol applies.	
8E~~D~~	DNSPs: Provide a summary of operating arrangements in place for each of the embedded generation	

Section 9: Assess and prepare network to accept supply

Item	Information required	Include the information in this column
9A	Briefly indicate how TNSP/DNSP would establish the scale of the supply	

Item	Information required	Include the information in this column
	disruption. List the other operational groups the TNSP/DNSP would communicate with for this purpose.	
9B	TNSPs: Briefly indicate the steps followed in assessing the readiness of the transmission network to be energised following a major supply failure. This would include identifying the cause of the system failure where practicable, and assessing the transmission network to identify unaffected parts of the network that can be energised. DNSPs: Briefly indicate the steps followed in assessing the status of the distribution network.	
9C	Indicate the factors considered in identifying critical substations to be manned. Provide the estimated times for on-call/other staff to arrive at critical substations (indicative average timeframes for urban and non-urban locations would be sufficient).	
9D	Provide a generic list of high level tasks (in priority order) performed using supervisory control (SCADA, PMUs) and/or by staff called in to ensure the safety of equipment and to prepare substations to accept supply.	
9E	DNSPs: Indicate approximate lead times to arrange stabilising load blocks (10-100MW blocks) in the early stages of restoration following black system condition. Comment on the ability of providing accurate discrete load blocks in the range 10-100MW.	

Section 10: Relevant technical information for FACTS controllers

Item	Information required	Include the information in this column
10A	Would a switchover between control modes/parameters occur under emergency or restoration conditions (e.g. line charging)? Is the switchover automatic or operator enabled (e.g. automatic gain reduction)? Please also list the criteria used to determine whether a switchover is required.	

10B	Whether any additional control loop applies during system restoration? (e.g. resonance control etc.)	
10C	Please provide the minimum fault level for: • The default settings and control strategy that would apply during normal operation? • Where the controller can provide stable response under emergency or restoration conditions?	
10D	Does this require any changes to static reactive plant/filter switching compared to that applied during system intact conditions?	
10E	What criteria are used to determine whether switchover should occur?	
10F	What changes would apply to control system settings/strategies compared to those applied for system intact conditions? To what extent have these control settings/strategies for system restoration been tested?	
10G	Whether or not parallel mode of operation with other FACTS controllers will be suspended during these emergency conditions?	

Section 11: Relevant technical information for Synchronous Condenser (SC)

For the purposes of this section Synchronous Condenser System includes all synchronous condenser units, auxiliaries and associated plant.

Item	Information required	Include the information in this column
11A	Following a loss of grid power, do staff need to be called out to shut down or restart Synchronous Condensers System if there are no faults? If faults occur on equipment, do staff need to be called out to manage the situation at the station? If yes, how long will it take to get on-call / standby/ other staff to the station site?	

11B	Is external supply required to safely shut down the Synchronous Condenser System? How long can the Synchronous Condenser System operate without external supply?	
11C	Provide the TNSP or DNSP substation where the Synchronous Condenser System connects to the power system. Number and grouping of units, voltage and MVAr capacity of each unit:	
11D	Where does the Synchronous Condenser System receive its external start up supply from? Provide the bus number, feeder and voltage level.	
11E	Do you need external supply to start a unit? If external supply is not necessary to start a unit, please provide the energy source used to return units to service. If external supply is required, what changes to the synchronous condenser system are required to restart without external supply?	
11F	Are there any unique/complex switching requirements to receive station auxiliary supply from the power system (including key protection that requires manual reset and whether the reset requires involvement from external parties)? If there are unique requirements, please specify the details of these requirements.	
11G	Can the Synchronous Condenser System be restarted remotely, or does it need local / on-site interactions?	
11H	Is there an emergency supply (e.g. diesel, gas turbine, UPS and batteries) installed at the site and how long it can operate independently? If yes, is it sufficient to safely shut down the Synchronous Condenser System ? Furthermore, is the backup system capable of barring the units (if required) and maintaining hydraulic pressure for	

	the bearings (if required) during the coasting phase?	
11IJ	How long will it take to safely shutdown, secure and make ready to restart the Synchronous Condenser System? Would the shutdown time be prolonged without grid connected auxiliary supply?	
11JK	Can the synchronous condensers that are in a shutdown sequence be restarted as soon as external supply becomes available? Or, does the shutdown sequence need to be completed first (e.g. sequence needs to be complete, coasting, countdown /timer, temperature, speed, auxiliary etc.)? Please provide this information as necessary.	
11KL	Provide the estimated electrical power requirements during various stages of the unit restart, including a breakdown for individual units, an aggregate, and house load where relevant. Include the minimum load level / active power required and start-up time for the Synchronous Condenser System. Please also provide the below details: • Starter system details (e.g. pony motor/VSC, SFC starter system etc.) • Auxiliary systems such as cooling, pumps etc. • Peak load during starting – breakaway, sustained load during starting, short term and steady state power demands etc. • Required minimum short circuit levels during restart	

<table>
<tr>
<td>11LM</td>
<td>Indicate how the time without external supply following a supply disruption affects the time to restart synchronous condenser units, under specific scenarios (identify and provide scenarios if applicable).

The required information may be provided in the example table format.

Please add additional columns and information if appropriate.</td>
<td>
<table>
<tr><td>Time without External Supply:</td><td>15 mins</td><td>1 hour</td><td>2 hours</td><td>4 hours</td></tr>
<tr><td>Scenario</td><td colspan="4">Time to restart units</td></tr>
<tr><td>Unit offline prior to event</td><td>30 mins to start 1 unit

45 mins to start all units</td><td>30 mins to start 1 unit

45 mins to start all units</td><td>(same as 1 hour offline)</td><td>(same as 1 hour offline)</td></tr>
<tr><td>Unit operating prior to event.</td><td>10 mins to start 1 units

20 mins to start all units</td><td>30 mins to start 1 units

45 mins to start all units</td><td>(same as 1 hour offline)</td><td>(same as 1 hour offline)</td></tr>
</table>
</td>
</tr>
<tr>
<td>11MN</td>
<td>Provide a detailed step-by-step procedure of the restart plan of the synchronous condenser station.

Include:

• station specific information AEMO should be aware of, in developing system restart plans

• the order of unit restarts and estimates of time required to prepare units to synchronise

• procedures for the following conditions where applicable

The required information may be provided in table format.</td>
<td></td>
</tr>
<tr>
<td>11NP</td>
<td>Does the reactive power or voltage range differ during emergency or restoration conditions compared to system intact?

Please advise if the MVAr capability of the synchronous condenser units differ from normal operation during the various stages of restart (i.e. as a black start unit, initial restart, under islanding conditions)

If yes, provide the individual unit specific reactive power capability charts associated with the various stages of restart.

Please include the capability diagram with a voltage range from e.g. 0.9-1.1 pu = f(unit active power output).</td>
<td></td>
</tr>
</table>

11OR	What are the: • losses; • continuous load level; and • active power requirement; once successfully synchronised to the transmission / distribution system?	
11PS	What is the frequency band/range for each unit and auxiliary equipment (e.g. pumps, drives, motors etc.) over which unrestricted operation is available? What are the extreme frequency bands/range for each unit and auxiliary equipment, where partial operation is or might be available?	Q
11QT	Would a switchover to another control mode occur under emergency or restoration conditions (e.g. line charging)? Is the switchover automatic or operator enabled? Please also list the criteria used to determine whether a switchover is required.	
11RU	What changes would apply to control system settings/strategies compared to those applied for system intact conditions?	
11SV	Whether or not parallel mode of operation with other synchronous condensers is possible or will be suspended during restoration or emergency conditions?	