MANUAL LOAD SHEDDING STANDARD

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1. INTRODUCTION

1.1. Purpose and scope

This is the Manual Load Shedding Standard (Standard) made under clause 4.3.4(e) of the National Electricity Rules (NER). It establishes standards for the controls, monitoring and secure communication systems to be arranged and maintained by *Network Service Providers* (NSPs) to facilitate Manual Load Shedding when required by AEMO.

This Standard is designated as a *power system operating procedure* under clause 4.10.1(a)(5) of the NER. It has effect only for the purposes set out in the NER. The NER and the National Electricity Law prevail over this Standard to the extent of any inconsistency.

1.2. Definitions and interpretation

1.2.1. Glossary

The words, phrases and abbreviations set out below have the meanings set out opposite them when used in this Standard. Terms defined in the National Electricity Law or the NER have the same meanings in this Standard unless otherwise specified in this section. Those defined terms are intended to be identified in this Standard by italicising them, but failure to italicise a defined term does not affect its meaning.

Table 1 Glossary

Term	Definition
Automatic Load Shedding	The operation of automatic emergency *load shedding* schemes. These can include protection or SCADA-based schemes that are permanently or selectively armed by a *Network Service Provider*, where the operation of the scheme can result in the loss of *load*. For example, under-frequency or under-voltage *load shedding* schemes, or other automatic remedial action schemes.
Control Centre	The nominated 24-hour operational control room of AEMO or a *Network Service Provider*.
Control Command	A representation of an instruction to perform a defined action (for example, opening a circuit breaker)
Demand Management	The temporary adjustment of energy demand at a particular location as a result of financial incentives, off-market contracts, voluntary load control or jurisdiction-mandated load reductions. For example, this may be achieved through the use of batteries, load curtailment initiatives, voltage reduction schemes or as a result of a *mandatory restriction schedule* (NER clause 3.12A.2). Where feasible, these services should be enacted before Manual Load Shedding is required.
DNSP	*Distribution Network Service Provider*
ICCP	Inter-Control Centre Communications Protocol
JDO	Jurisdictional Designated Officer
JSSC	*Jurisdictional System Security Coordinator*
Load Shedding Plans	Specific plans developed by the TNSP which are used when shedding load within its *transmission network and connected distribution networks*.
Manual Load Shedding	Involuntary interruption of *supply* to one or more customer *connection points* through manual intervention to open a circuit breaker or switch within the *power system*. This may occur through a SCADA command or through local switching operations using substation remote terminal units (RTUs) or control switches. Manual Load Shedding does not include Automatic Load Shedding or Demand Management.

Term	Definition
NER	National Electricity Rules
Priority Load Shedding Schedules	The schedules developed by each JSSC as part of its jurisdictional load shedding guidelines, setting out any *sensitive loads* and the order in which *loads* may be shed and restored by AEMO.
SCADA	Supervisory Control and Data Acquisition. This is a control system architecture that uses computers and communication networks to receive telemetry from, or control peripheral devices, such as remote terminal units.
TNSP	*Transmission Network Service Provider*

1.2.2. Interpretation

This Standard is subject to the principles of interpretation set out in Schedule 2 of the National Electricity Law.

1.3. Related documents

Table 2 Relevant Procedures

Procedure	Title	Published by
SO_OP_3715	Power System Security Guidelines	AEMO
SO_OP_3707	Issue of Directions and Clause 4.8.9 Instructions	AEMO
SO_OP_4319	Load Shedding Procedure for Queensland	AEMO
SO_OP_4329	Load Shedding Procedure for NSW and ACT	AEMO
SO_OP_4339	Load Shedding Procedure for Victoria Region	AEMO
SO_OP_4359	Load Shedding Procedure for South Australia	AEMO
SO_OP_4369	Load Shedding Procedure for Tasmania	AEMO

2. RESPONSIBILITIES

2.1. Jurisdictional schedules

In accordance with clause 4.3.2(f) of the NER, each JSSC is responsible for preparing a jurisdictional load shedding schedule for each *region* for *load shedding* and restoration purposes, including Priority Load Shedding Schedules comprising:

(a) a schedule of *sensitive loads*, including specification of any priority to be given to each *sensitive load* over other *sensitive loads* and specification of any *loads* for which JSSC approval is required before the *load* may be shed by AEMO; and

(b) a priority schedule for the shedding and restoration of *loads* other than *sensitive loads*, which defines the priority to be applied to *load* blocks.

2.2. Load shedding procedures

In accordance with NER clause 4.3.2(h), AEMO is responsible for maintaining *load shedding procedures* for each participating jurisdiction (Table 2).

2.3. Load shedding plans

TNSPs are responsible for developing and reviewing Load Shedding Plans. These must be consistent with AEMO's *load shedding procedures*, the Priority Load Shedding Schedules and this Standard. Each TNSP must develop its Load Shedding Plan and review it annually in consultation with the DNSPs in the *region* and other relevant stakeholders within the jurisdiction.

A TNSP must use its Load Shedding Plan when directed by AEMO to shed or restore *load*.

2.4. Load shedding and restoration directions

If required to maintain *power system security*, AEMO will issue a direction to a relevant TNSP to manually interrupt *load*, and subsequently to restore *load*, under section 115 and 116 of the National Electricity Law. For NER purposes, these directions are *clause 4.8.9 instructions*.

Where practicable, AEMO will advise TNSPs if the potential for Manual Load Shedding in their *region* is anticipated. However, it may not be possible to provide any advanced warning.

3. REQUIREMENTS FOR LOAD SHEDDING PLANS

3.1. Amount of load shedding to be achieved

A TNSP must utilise its Load Shedding Plan to interrupt suitable *load* blocks, such that the amount of *load* shed is not less than the amount specified in AEMO's direction. Due to the granularity of most *load* blocks, it is possible that more *load* will be shed than was specified by AEMO, but the TNSP must use best endeavours to minimise any *load* shed in excess of the amount directed.

3.2. Priority of load blocks

Load Shedding Plans must document available *load* blocks across the *region*, including any specifically identified by the Priority Load Shedding Schedules. Subject to those schedules, the first preference should be given to *load* blocks where the *load* can be shed through a minimum of SCADA Control Commands. These first preference *load* blocks should also minimise the requirement for verbal communication and Control Commands between Control Centres.

3.3. Consideration of power system impact

Load Shedding Plans must consider the implications on the *power system* as a result of each *load* block being shed. For instance, it may be necessary to switch out *capacitor banks* or adjust *transformer tap positions* before interrupting *load*. Similarly, it may be necessary to check the directionality of the MW flows if there is distributed *generation* in the subsystem.

3.4. Contingency planning

Load Shedding Plans must include arrangements for the preparation of suitable *load* blocks to be shed following the next *contingency event* in situations where the potential for Manual Load Shedding can be anticipated, such as a forecast *lack of reserve* condition. The TNSP is responsible for communicating the details of these arrangements, in real-time, with the DNSPs and other relevant stakeholders within the jurisdiction.

3.5. Rotational Load Shedding

Load Shedding Plans must take into account the requirements of the Priority Load Shedding Schedules and the *load shedding procedures*.

The Schedules may specify maximum time frames for which a particular *load* may be interrupted before rotational *load shedding* is initiated. In the event that rotational *load shedding* is required, the next specified *load* block should always be disconnected before restoring the presently interrupted block of *load*.

In major *power system* incidents, it may not be feasible to achieve specified maximum time frames in every instance due to insufficient remaining low priority *load* or competing demands in the relevant Control Centre. In such cases, *Network Service Providers* are expected to use best endeavours to comply. For example, TNSPs and DNSPs must specifically consider the implications for rotational *load shedding* and restoration sequences in the context of applicable requirements in total fire ban conditions, and include reasonable measures in the Load Shedding Plans to comply with an obligation to conduct rotational *load shedding*.

4. RESTORATION OF LOAD

When applicable, AEMO will issue *load* restoration instructions to the relevant TNSP. The TNSP will then coordinate *load* restoration with the DNSPs in that jurisdiction. The overall objective is to restore as much *load* as quickly as possible. However, consideration must be given to the implications of any anticipated cold *load* pickup, delayed operation of any inverter-based *embedded generation*, the actual strength of the *power system* and *generating system* availability and *ramp rates*.

5. CONTROL AND COMMUNICATION SYSTEMS

Manual Load Shedding will be initiated through operational (verbal) communication between Control Centres. In the event that Manual Load Shedding is required, AEMO will verbally communicate with the relevant TNSP, who will then confirm the instruction (by read-back). The TNSP will refer to the Load Shedding Plans and will verbally communicate with the DNSP Control Centres to coordinate the required load shedding. AEMO may communicate directly with the DNSP if required under the circumstances. For instance, following the loss of telephone communications between AEMO and a TNSP. Any requirement to return a phone call to confirm the instruction should be avoided through the appropriate use of operational communication protocols.

In the event that a TNSP initiates Manual Load Shedding, this action must be verbally communicated to the AEMO Control Centre and the JSSC/JDO as soon as possible.

AEMO, the TNSPs and DNSPs must conduct regular performance reviews of the available operational voice communications systems to ensure that such instructions can be conveyed, when required. In accordance with NER clause 5.7.4(a1)(4), the TNSPs and DNSPs should also regularly review SCADA point mapping to ensure that Control Commands via SCADA will be correctly actioned by the respective substation equipment. Special attention should be given to any SCADA Control Command that utilises ICCP or where the controlled substation equipment is owned by a third party.

Automatic Load Shedding and Demand Management systems may utilise other dedicated communications channels. The specification and testing of these channels is outside the scope of this Standard.