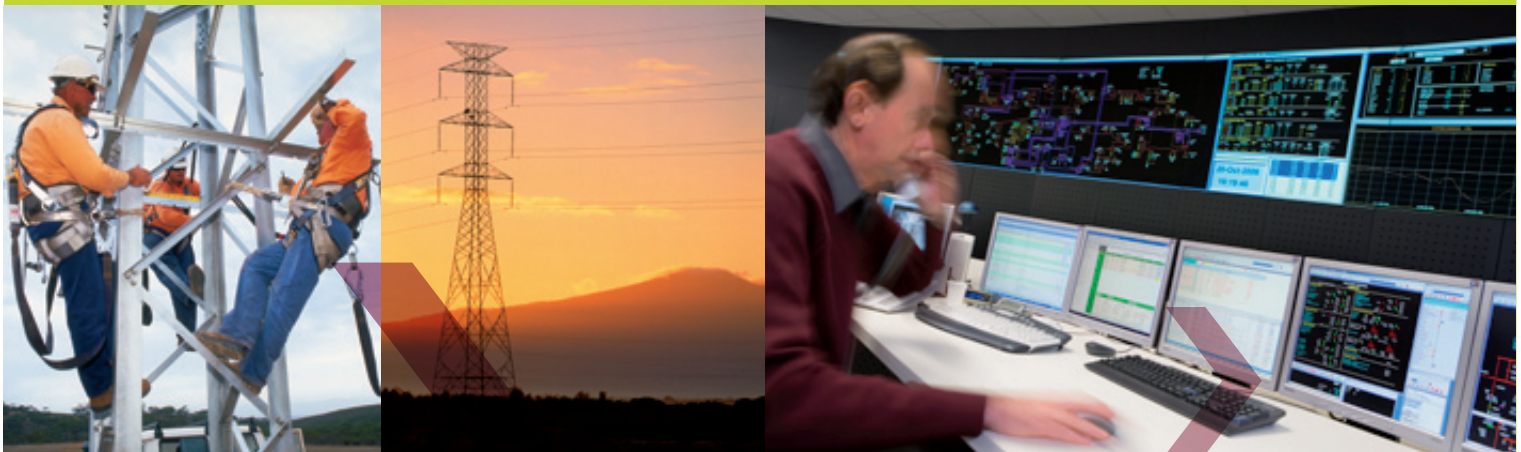


Switching Program Preparation Guide

Version 1.0
August 2010



ElectraNet
electricity transmission

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Revision Record					
Date	Version	Description	Author	Checked By	Approved By
July 2008	A	Initial	K Pasfield & A Wheaton	Switching Committee	Switching Committee
August 2010	1.0	Rewrite & Update	A Wheaton	Switching Committee	Switching Committee

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1. Foreword

Since the original release of this booklet in 2008, ElectraNet has continued on its path of continuous improvement by reviewing switching practices, listening to your feedback and looking at industry best practice. The learning from these activities has been applied to the update of this booklet and it is hoped that this has not only resulted in the improvement of this booklet but also in the enhancement of the resultant System Switching Programs in the key area of safety through greater clarity.

To that end the intent of this booklet to document a standard methodology for the preparation of System Switching Requests (SSRs) remains unchanged as do the benefits of higher quality and consistent SSRs from all companies submitting requests.

Please take the time to review and adopt the new guidelines and as always ElectraNet welcomes your ideas on how this booklet may be further improved.

Greg Pouferis
Network Operations Manager

2. Background

ElectraNet Pty Ltd (ElectraNet) is the principal electricity Transmission Network Service Provider (TNSP) in South Australia, operating as part of the National Electricity Market under National Electricity Rules. The company's revenue is set by the Australian Energy Regulator (AER).

ElectraNet's role is to own and manage the high-voltage transmission lines and substations that connect this State's electricity generation system to multiple customer connection points, including ETSA Utilities' lower-voltage distribution network. The role of ElectraNet in the electricity supply chain is shown in Figure 1:

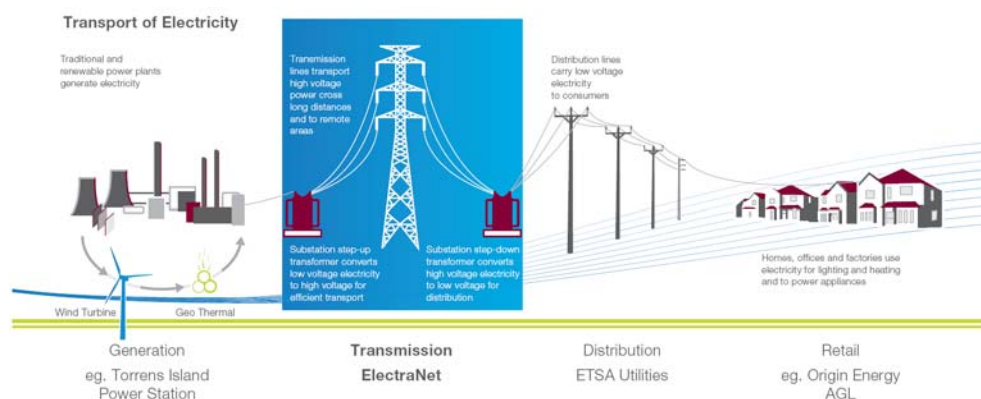


Figure 1: Role of ElectraNet in the electricity supply chain

ElectraNet's transmission network is one of the most extensive regional transmission systems in Australia, extending across some 200,000 square kilometres of the State. This network consists of transmission lines

operating at 132,000 and 275,000 Volts, which are supported by both lattice towers and large stobie poles.

3. Introduction

The preparation of System Switching Requests and production of System Switching Programs is an integral and vital part of the switching process.

The application of these guidelines and rules will assist in standardising the presentation and content of System Switching Programs. This will deliver the following outcomes:

- Increase the safety and efficiency of the switching exercise by enabling switching crews to have a clear understanding of the task, due to a consistent approach to isolation practices.
- Promote a higher level of understanding by switching crews when checking and executing System Switching Programs.
- Enable inexperienced System Switching Program writers to provide a product of a consistent and uniform standard.
- Reduce the time required by the System Switching Co-ordinator and Transmission System Operators in checking and correcting inconsistently prepared System Switching Requests.
- Minimise the time required for the System Switching Request and System Switching Program checking and approval process.

4. Glossary of terms

CB	Circuit Breaker
HMI	Human Machine Interface (substation screen based controls)
LCF	Local Control Facility (substation screen based controls)
LV	Low Voltage
NSP	Network Switching Program (EU)
OLTC	On Load Tap Changer
PASS	Plug and Switch System
HIS	Hybrid Integrated Switchgear
SSC	System Switching Coordinator
SSD	System Switching Diagram
SSP	System Switching Program

SSR	System Switching Request
SWOBS	Switching Writer and Outage Booking System
TF	Transformer
TSO	Transmission System Operator
VT	Voltage Transformer
NSP	Network Switching Program (EU)

5. References

- ElectraNet Switching Manual
(http://www.electranet.com.au/safety_switching.html)
- Asset Access Manual
(<http://www.electranet.com.au/asset.html>)
- TSO Abnormals Database
- SWOBS
- Switching Diagrams
- Substation Switching Diagrams

6. SSP Protocols

All SSP's shall comply with the following controls:

- ElectraNet Switching Manual, as amended from time to time.
- ElectraNet Transmission Outage Planning and System Access Control procedure, as amended from time to time

7. Switching Philosophy

Switching procedures should be planned in such a way to ensure that:

- Where practical, switching crew movement should be minimised between switching devices in the switchyard. Making the switching crew walk back and forth across a switchyard may encourage operators to alter sequences of operations, with or without approval.
- Establish an appropriate number of isolation points required for a safe isolation only. Don't guess or assume. If a device is not a source of in feed, then don't include it as an isolate point, e.g. a VT LV CB with no alternate supply.
- Devices must not be listed under the "Limits of Isolation" unless they are tagged or have a sign erected as part of the switching.
- For 110/230/400V isolations, if you call a device a "limit of isolation" then you will need to apply Main Earths at that point. (Note refer to the Switching Manual for special isolation and earthing conditions)

relating to LV isolations). If you are uncertain about the details of LV isolations, refer to the System Switching Co-ordinator **before** submitting the SSR.

- Nominate the correct number of Main Earths or Supplementary Main Earths required for a safe isolation only. Additional earths that are not necessary are a waste of time and effort for the switching crew and may cause confusion.
- When planning an outage, always allow for the maximum amount of work to be carried out on the isolated equipment during the outage.

During SSR Preparation, ensure all work parties who could effectively use the outage are involved and included on the SSR. The unplanned arrival of work crews during an outage requires alterations to the SSP. Alterations to SSP's should be avoided where possible.

- If you become aware that an SSP will require alteration then arrange for the alterations to be made prior to the event not as the switching crew are about to start the switching.

8. Alteration to Published SSPs

Alterations to published SSPs or ESP can expose those involved in the switching process to increased risk of error. This is because alterations to the switching program will involve fewer checks than a program that has gone through the complete preparation process.

The modification of SSPs / ESPs will be divided into two categories:

- Emergency or Minor Modification; and
- Significant Modification.

8.1 Emergency or Minor Modification

There will often be occasions where difficulties are experienced during switching i.e. an earth lug is missing or an isolator cannot be opened.

Unless these problems require an extensive modification to the program they will be handled in the normal manner as described in the Switching Manual with all operational copies being modified by agreement with the TSO and the field crews.

The simple rule of thumb will be that the modification of a few items will be accepted.

8.2 Significant Modification

If it is discovered for example with a project SSP / ESP that significant changes will be required for an isolation i.e. extensive sequence changes, significant extensions to isolations, earthing etc then a resubmission of an SSR for the entire program or the restoration will be required.

TSOs have been instructed not to accept extensively modified SSPs / ESPs. Electronic submission and distribution means that the replacement program can be produced at relatively short notice. The Switching Manual requires that all involved in the switching will have exactly the same program and not programs where the alterations may have been dictated over the telephone.

9. Switching Practices

9.1 SSP / ESP Layout

A new layout for SSPs/ESP is being introduced.

Operate Time	Item #	Location	Type	Item
	1.	Para	Supervisory	OPEN CB6517
	2.	Para	Supervisory	OPEN CB6518
	3.	Brinkworth	Supervisory	OPEN CB6527
	4.	Brinkworth	Supervisory	OPEN CB6528
	5.	Brinkworth	Supervisory	OPEN A6806
	6.	Brinkworth	Supervisory	OPEN A5806
	7.	Brinkworth	Local	LOCK A5806 inoperative & AFFIX DO NOT OPERATE SIGN OR TAG

9.2 Switching Briefing

A formal item will be placed on the switching program to carry out a briefing at **each switching location**.

“CARRY OUT switching briefing and ADVISE TSO before commencing switching”

9.3 Location Naming

The site location of the switching will be identified for each item. This will assist the switching crew in identifying the items that they are responsible for.

It is not sufficient only to identify the item when there is a change of location.

9.4 Type of Switching

The type of switching i.e. supervisory or local will now be required to be indicated at each switching item.

9.5 Authority to Energise (A to E)

The A to E system is now obsolete and has been replaced by a new energisation system called Request to Energise (R to E).

For complete details please refer to the Switching Manual. An example of the use of the new system is included in the Sample SSPs in the Appendices of this booklet.

9.6 AEMO Notification

AEMO must be notified prior to the isolation/restoration commencing. Permission to restore should be placed after earthing has been removed and manual isolators closed immediately prior to the commencement of the control panel or supervisory switching.

9.7 Energising Lines Terminating At Power Stations

Lines that terminate at power stations should normally be energised from the end remote from the power station, unless advised otherwise.

Energising lines remote from power stations helps to reduce fault current and minimises the disturbance to online generators if there is a line fault.

9.8 Parallel OLTC's To Non Auto

Always ensure that parallel OLTC's are on the same equivalent voltage tap prior to unloading or loading either transformer.

OLTC's in a parallel configuration can remain in Auto during switching if the switching devices used are circuit breakers or motorised disconnectors.

OLTC's in a parallel configuration must be placed to Non Auto when one or more of the switching devices used is a manual disconnector.

Where the OLTC VT reference is taken from the transformer to be unloaded the OLTC's shall be placed in Non Auto. This is to prevent unwanted tap changers occurring during switching.

9.9 Locking Off Motorised Disconnectors and Earthing Switches

In ElectraNet substations motorised disconnectors must only be locked inoperative in the **open** position, when they are part of an isolation procedure. Motorised earthing switches must be locked inoperative in **both** the open and closed state.

Different standards apply for the Murraylink Berri and Murraylink Redcliffs converter stations. These are the only two exceptions to the policy. The deviation is due to the unique nature of the Murraylink switchgear. Refer SMSC for advice.

9.10 Energising and De-Energising Lines where Line Reactors are Installed

To minimise over voltage at the end of an open ended transmission line, energising and de-energising the line will normally be carried out from the end of the line remote from the line reactor, unless advised otherwise.

Remember to consider the isolator interlocking arrangements when switching reactors in and out of service.

9.11 Changing Limits of Isolation & Earthing During a Multi-stage SSP

Where the limits of isolation are changed as part of the restoration on an SSP, the items relating to the new limits and associated earthing will be established prior to removing any of the existing earths and limits of isolation.

9.12 Earthing Procedures

Earths should not be designated as a Main Earth unless they are to be the permanent Main Earth for the isolation. Where Earthing switches are available, they should be used to earth equipment prior to the installation of any flexible earths.

Earthing switches closed temporarily to allow the installation of flexible earths must not be listed as Main Earths.

9.13 Multiple Changing of Line Earthing Locations

On complex high voltage line work it may be necessary and practical to periodically relocate the Main Earth and or Supplementary Main Earth positions.

In this instance, a separate item for each earth location is not required on the SSP, a single item referring to a Main Earth or Supplementary Main Earth will suffice. The exact location of the earths will be listed individually on an attached sheet, updated as the earths are installed and removed. See SSR sample for correct terminology.

A "Line Crossing Main Earth Reference Sheet" form can be downloaded from the ElectraNet website.

9.14 Coding

In accordance with the Switching Manual, where a work party is working under an isolation that was carried out by, or will be restored by another work party, the work party will code with the TSO.

A code word is still required even if both working parties work for the same company, section or manager.

Coding is not required if all work parties on site are working **directly** under an **on-site** leader or supervisor. Note that this concept does not apply to work parties separated by distance i.e. different substations. Coding by each work party **is** required in this case.

Coding is a simple and effective method of controlling premature restoration. The use of coding is to ensure the highest level of safety for all personnel at a site working on isolated equipment.

When preparing an SSR all possible work parties requiring access to the isolated equipment should be considered and a separate item for each work party to code will be included on the SSP.

Remember that only ElectraNet accredited Switching Operators are permitted to code. If any personnel require access to an ElectraNet isolation, and they are **not** accredited Switching Operators, they must be issued with an Isolation/Restoration Certificate. The Isolation/Restoration Certificate must also be used where ElectraNet carries out an isolation for a customer.

The designated team or site leader has a responsibility to manage all personnel on site with respect to coding and must not transfer their responsibilities to a different work party, possibly exposing them to a significant safety risk.

9.15 Placement of Do Not Operate Signs and Tags

Do Not Operate Signs and Tags must not be placed at open switching devices **unless** the device is listed on an SSP as an isolation point.

9.16 Roping Off

A separate item is required for each roping off location to comply with the Switching Manual general requirement to have a separate item for each operation.

9.17 Work Party Leader Briefing

There is a formal requirement that a switching operator brief the leader(s) of any work party on any isolation under which the work party will carry out work. The briefing utilises a "Work Party Briefing Form" to achieve this purpose. A briefing form is required for each site and an SSP item is required for each site.

“PREPARE Work Party Briefing form and brief Work Party Leaders as required”

9.18 Secondary Isolations

Secondary isolations are required to prevent the inadvertent operation of protection on isolated HV equipment. Secondary isolations involving mechanical and 230/400V systems may also be required to provide a safe work area for a working party. Secondary isolations must not be included on SSPs / ESPs.

It is the responsibility of the Leader of the Work Party to ensure that the necessary secondary isolations are carried out to prevent inadvertent protection operation and provide a safe work area.

It is also the responsibility of the Leader of the Work Party to ensure that secondary isolations are restored and that equipment is safe to restore.

9.19 Transformer De-energising / Energising

Transformers will normally be unloaded by opening the lower voltage side first and then de-energised by opening the higher voltage side.

Star/Delta transformers will always be energised from the higher voltage side first. Energising a Star/Delta transformer via the lower voltage side will cause the high voltage side delta winding to be energised without a neutral point and there is a risk of a high "floating voltage" that could damage the transformer windings.

Star/Star transformers that have the tap changer located on the lower voltage winding will be energised from the lower voltage side first. When energising these transformers from the higher voltage side, there is a risk of exceeding the rated voltage of the transformer, as there is no control over the output voltage when the transformer is unloaded. In addition, new types of differential and over-fluxing protection systems may operate during transformer energising.

When energising Star/Star transformers from the lower voltage side, the tap changer will be set on a specific tap to control the voltage on energising so that the transformer is energised at rated winding voltage. This also reduces inrush current, puts less strain on the transformer windings and reduces the risk of a voltage depression on the transmission system.

The tap position for energising these transformers is normally calculated by the ElectraNet Power System Analyst (Ph. 8404 7189). The tap position will be recorded on the SSD adjacent to the transformer and included as an item on the SSP.

9.20 OLTC Controls

It is expected that switching operator training will encompass out of step operation. For this reason the aspects of placing OLTC in step etc will not be spelt out in detail on switching sheets.

Where there is operational reason for the manipulation of the OLTC during switching placing on a specific tap for energising or placing to non auto for VAR transfer these items will be included on the SSP. It is expected that all SSPs / ESPs involving OLTCs will use a combination of the following items.

9.20.1 Restoration

"CHECK OLTC's in a suitable condition for restoration"

"CHECK Nos 1 & 2 OLTCs on the correct tap"

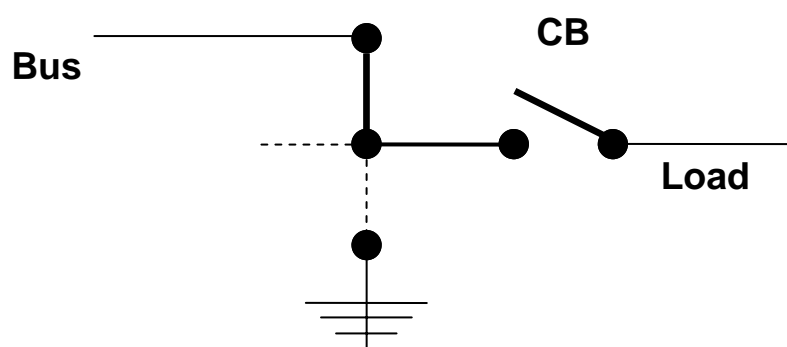
"CHECK Nos 1 & 2 OLTCs in NORMAL operating mode"

9.21 Flexible Line Earths

The installation of line earths remote from the source substations should only be carried out after the line earths have been established at the source substations. Likewise, remote line earths should be removed prior to the removal of the line earths at the substation.

9.22 PASS & HIS Switchgear

The PASS Switchgear consists of 3 separate; SF6 insulated switching poles, which consist of a combined Isolator/earth switch and CB chamber.



The Combined Isolator/Earth switch (3-pole) consists of 2 fixed contacts and 1 moving contact. When the moving contact rotates 90°, the bus side disconnecter opens and closes to earth after a further rotation of 90°.

9.22.1 PASS/HIS Locking Off

The disconnecter drive may be locked mechanically, using the hinge pin and padlock, in the three main positions: (see figure above)

1. Line closed
2. Isolated position
3. Earth closed

9.22.2 PASS/HIS Switching Terminology

OPEN	CBXXXX
OPEN	AXXXX
CLOSE	AXXXE (or EXXXX)
LOCK	AXXXE (or EXXXX) CLOSED (MAIN EARTH)

9.23 Minimising Line VAR Flow during Switching

The following process should be used to minimise VAR flow in a transmission line when the line (loop circuit) is to be split using a switching device which has very a limited load breaking capability.

9.23.1 To Transfer

1. Place all input source OLTC's which supply the line to NON AUTO.
2. Adjust the OLTC's to give the minimum current through the line measured at the nearest metering point to the switching device.
3. The Switching Operator must subtract any loads that may be "Teed Off" between the metering point and the switching device.
4. The Switching Operator must check that the resultant value is within the loop breaking capability of the switching device (see ElectraNet Switching Manual).
5. Record OLTC tap positions
6. Open switching device.
7. Place OLTC's to AUTO.

9.23.2 To Restore

8. Place OLTC's in NON AUTO on previously noted tap.
9. Close switching device (1 attempt only, don't re-open unless VAR minimisation procedure is repeated).
10. Place OLTC's to AUTO

9.24 66kV Bus Selector Switching at Para and Happy Valley

66kV bus selector isolators must not be used to break ties between buses. There is a possibility that the isolators tying the buses may be transferring currents in excess of their rated load breaking capacity.

A check item will be included on the SSP to confirm that prior to opening a 66kV bus selector isolator, its adjacent isolator is open and a warning tag applied.

9.25 Supervisory Operation of Switchgear

All supervisory capable switchgear will normally be operated remotely by the TSO from the System Monitoring and Switching Centre.

At the discretion of the TSO, control panel/HMI operation of these devices may be requested. Control panel/HMI operation of switching devices is acceptable during the training of switching operators but must be negotiated with the duty TSO.

A report of Supervisory capable disconnectors is available from the ElectraNet website.

Check that all section headings are numbered and worded exactly as described in the contents page.

10. Responsibilities

10.1 The SSR Originator, Planner, Project Manager, Commissioning Officer

- Research the proposed work, isolation, earthing point locations and earthing requirements.
- Research potential LV back feed situations. Provide a marked up/new SSD where applicable prior to placing bookings in SWOBs.
- Provide SSR Writer with accurate and practical limits of isolation and earthing requirements

10.2 SSP Writer

- Obtain and provide all supporting documentation, including temporary setting memos and NSP's etc and attach to SSR.

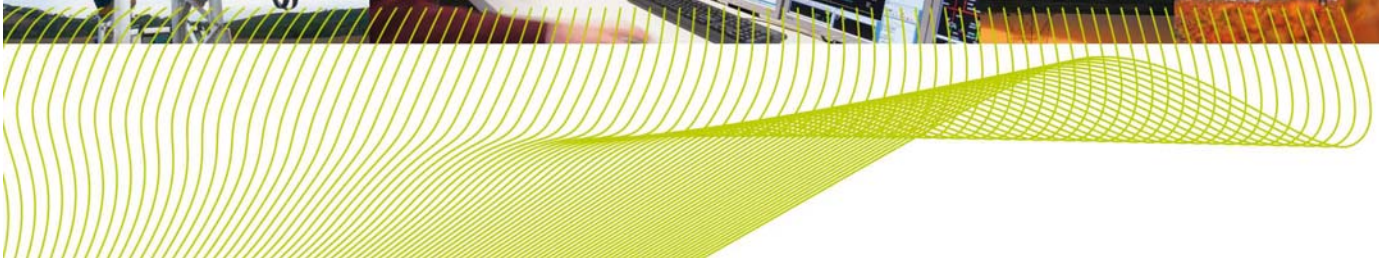


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Appendices

August 2010

Version 1.0



Appendix A Sample SSPs

A1 Para SVC (1 work party + Request to Energise)

1.	Para	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
2.	SMSC	Local	TSO to OBTAIN PERMISSION from AEMO for isolation to proceed
3.	Para	Supervisory	STOP SVC No 2
4.	Para	Supervisory	OPEN CB6600
5.	Para	Supervisory	OPEN A6991
6.	Para	Supervisory	OPEN A6990
7.	Para	Local	LOCK A6990 inoperative
8.	Para	Local	LOCK A6991 inoperative & AFFIX DO NOT OPERATE SIGN/TAG
9.	Para	Local	WAIT 10 minutes
10.	Para	Local	PROVE DEAD, CLOSE & LOCK earthing switch A6990E (Main Earth)
11.	Para	Local	PROVE DEAD, CLOSE & LOCK earthing switch E7931 (Main Earth)
12.	Para	Local	PROVE DEAD & EARTH CB6600 side of A6991 (Main Earth)
13.	Para	Local	ROPE OFF WORKING AREA AND SURVEY all conductors and equipment in and adjacent to the working positions, note all live parts and advise all personnel on the site.
14.	Para	Local	Prepare Work Party Briefing Form and carry out briefings as required.
15.	Para	Local	ADVISE TSO on completion of the above items & OBTAIN PERMISSION TO PROCEED
16.	Para	Local	PROVE DEAD & ERECT WORKING EARTHS AND RECORD THEIR

			LOCATION prior to commencing work within the area bounded by MAIN EARTHS
17.	Para	Local	REMOVE vehicle access barriers within the defined Work Area as required and advise all personnel on site.
TO RESTORE TO NORMAL			
18.	Para	Local	CHECK all vehicle access barriers replaced
19.	Para	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
20.	Para	Local	CHECK Work Party Briefing Form completed
21.	Para	Local	CHECK R to E Received from Design Manager Fred Bloggs for #1 SVC at Para
22.	Para	Local	CHECK all personnel clear
23.	Para	Local	REMOVE all working earths & ropes
24.	Para	Local	CHECK all SVC 2 access gates CLOSED & LOCKED
25.	Para	Local	REMOVE earths CB6600 side of A6991 (Main Earth)
26.	Para	Local	OPEN & LOCK Earthing switch E7931 (Main Earth)
27.	Para	Local	OPEN & LOCK Earthing switch A6990E (Main Earth)
28.	Para	Local	UNLOCK A6990 & make operative
29.	Para	Local	UNLOCK A6991, make operative & REMOVE DO NOT OPERATE SIGN/TAG
30.	SMSC	Local	TSO to OBTAIN PERMISSION from NEMMCO for restoration to proceed
31.	Para	Supervisory	CLOSE A6990
32.	Para	Supervisory	CLOSE A6991

33.	Para	Supervisory	CLOSE CB6600
34.	Para	Supervisory	START SVC No 2
35.	Para	Supervisory	PLACE SVC No 1 & 2 to PARALLEL
36.	Para	Supervisory	ADVISE TSO after operations completed

A2 Isolation & earthing of lines & multiple changing earth locations on lines. Line work (1 work party)

1.	Para	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
2.	Brinkworth	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
3.	Line	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
4.	SMSC	Local	TSO to OBTAIN PERMISSION from AEMO for isolation to proceed
5.	Brinkworth	Supervisory	OPEN CB6527
6.	Brinkworth	Supervisory	OPEN CB6528
7.	Para	Supervisory	OPEN CB6517
8.	Para	Supervisory	OPEN CB6518
9.	Para	Supervisory	OPEN A6707
10.	Para	Supervisory	CLOSE CB6518
11.	Para	Supervisory	CLOSE CB6517
12.	Brinkworth	Supervisory	OPEN A6806
13.	Brinkworth	Supervisory	CLOSE CB6528
14.	Brinkworth	Supervisory	CLOSE CB6527
15.	Brinkworth	Local	LOCK A6806 inoperative & AFFIX DO NOT OPERATE SIGN/TAG
16.	Para	Local	LOCK A6707 inoperative & AFFIX DO NOT OPERATE SIGN/TAG
17.	Para	Local	PROVE DEAD, CLOSE & LOCK line earthing switch A6707E (Main Earth)
18.	Brinkworth	Local	PROVE DEAD, CLOSE & LOCK line earthing switch A6806E (Main Earth)
19.	Line	Local	PROVE DEAD & EARTH between

			working position & LINE CROSSINGS as required (to be recorded by Team Leader and TSO on a daily basis) (Main Earth)
20.	Line	Local	PROVE DEAD & EARTH between working position & LINE CROSSINGS as required (to be recorded by Team Leader and TSO on a daily basis) (Supplementary Main Earth)
21.	Line	Local	ROPE OFF WORKING AREA AND SURVEY all conductors and equipment in and adjacent to the working positions, note all live parts and advise all personnel on the site.
22.	Para	Local	ADVISE TSO on completion of the above items
23.	Brinkworth	Local	ADVISE TSO on completion of the above items
24.	Line	Local	Prepare Work Party Briefing Form and carry out briefings as required.
25.	Line	Local	Line Personnel to CODE with TSO & OBTAIN PERMISSION TO PROCEED on completion of work party briefings.
26.	Line	Local	ADVISE TSO on completion of the above items & OBTAIN PERMISSION TO PROCEED
27.	Line	Local	PROVE DEAD & ERECT WORKING EARTHS AND RECORD THEIR LOCATION prior to commencing work within the area bounded by MAIN EARTHS
TO RESTORE TO NORMAL			
28.	Line	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
29.	Para	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
30.	Brinkworth	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching

31.	Line	Local	CHECK Work Party Briefing Form completed
32.	Line	Local	Line Personnel to RELEASE CODE with TSO
33.	Line	Local	CHECK all personnel clear
34.	Brinkworth	Local	CHECK all personnel clear
35.	Para	Local	CHECK all personnel clear
36.	Line	Local	REMOVE all working earths & ropes
37.	Line	Local	REMOVE earths between working position & LINE CROSSINGS (As recorded by Team Leader and TSO on a daily basis) (Supplementary Main Earth)
38.	Line	Local	REMOVE earths between working position & LINE CROSSINGS (As recorded by Team Leader and TSO on a daily basis) (Main Earth)
39.	Brinkworth	Local	OPEN & LOCK line earthing switch A6806E (Main Earth)
40.	Para	Local	OPEN & LOCK line earthing switch A6707E (Main Earth)
41.	Para	Local	UNLOCK A6707 make operative & REMOVE DO NOT OPERATE SIGN/TAG
42.	Brinkworth	Local	UNLOCK A6806 make operative & REMOVE DO NOT OPERATE SIGN/TAG
43.	SMSC	Local	TSO to OBTAIN PERMISSION from AEMO for restoration to proceed
44.	Brinkworth	Supervisory	OPEN CB6527
45.	Brinkworth	Supervisory	OPEN CB6528
46.	Para	Supervisory	OPEN CB6517
47.	Para	Supervisory	OPEN CB6518
48.	Para	Supervisory	CLOSE A6707
49.	Brinkworth	Supervisory	CLOSE A6806

50.	Brinkworth	Supervisory	CLOSE CB6527
51.	Brinkworth	Supervisory	CLOSE CB6528
52.	Para	Supervisory	CLOSE CB6517
53.	Para	Supervisory	CLOSE CB6518
54.	Para	Local	ADVISE TSO after operations completed
55.	Brinkworth	Local	ADVISE TSO after operations completed
56.	Line	Local	ADVISE TSO after operations completed

A3 TF isolations on shared sites (3 work parties)

***NOTE: CHECK LOADS**

1.	Happy Valley	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
2.	SMSC	Local	TSO to OBTAIN PERMISSION from AEMO for isolation to proceed
3.	SMSC	Local	TSO to REQUEST CLEARANCE to PROCEED from DNC
4.	Happy Valley	Supervisory	OPEN CB5256
5.	Happy Valley	Supervisory	OPEN CB6523
6.	Happy Valley	Supervisory	OPEN CB6521
7.	Happy Valley	Supervisory	OPEN A6636
8.	Happy Valley	Supervisory	CLOSE CB6523
9.	Happy Valley	Supervisory	CLOSE CB6521
10.	Happy Valley	Local	LOCK A6636 inoperative & AFFIX DO NOT OPERATE SIGN/TAG
11.	Happy Valley	Local	OPEN & LOCK A5210 & AFFIX DO NOT OPERATE SIGN/TAG
12.	Happy Valley	Local	CHECK A5209 OPEN & LOCKED & AFFIX DO NOT OPERATE SIGN/TAG
13.	Happy Valley	Local	OPEN & LOCK A5208 & AFFIX DO NOT OPERATE SIGN/TAG
14.	Happy Valley	Local	PROVE DEAD, CLOSE & LOCK TF earthing switch A6636E (Main Earth)
15.	Happy Valley	Local	PROVE DEAD & EARTH A5209 side of A5208 (Main Earth)
16.	Happy Valley	Local	PROVE DEAD & EARTH A5208 side of A5209 (Main Earth)
17.	Happy Valley	Local	PROVE DEAD & EARTH A5208 side of A5210 (Main Earth)
18.	Happy Valley	Local	ROPE OFF WORKING AREA AND

				SURVEY all conductors and equipment in and adjacent to the working positions, note all live parts and advise all personnel on the site.
19.	Happy Valley	Local		Prepare Work Party Briefing Form and carry out briefings as required.
20.	Happy Valley	Local		FRED Personnel to CODE with TSO & OBTAIN PERMISSION TO PROCEED on completion of work party briefings.
21.	Happy Valley	Local		ISSUE Isolation Certificate to Harry Personnel and allow work to commence on completion of work party briefings.
22.	Happy Valley	Local		ADVISE TSO on completion of the above items & OBTAIN PERMISSION TO PROCEED
23.	Happy Valley	Local		PROVE DEAD & ERECT WORKING EARTHS AND RECORD THEIR LOCATION prior to commencing work within the area bounded by MAIN EARTHS
24.	Happy Valley	Local		REMOVE vehicle access barriers within the defined Work Area as required and advise all personnel on site.
TO RESTORE TO NORMAL				
25.	Happy Valley	Local		CARRY OUT switching briefing and ADVISE TSO before commencing switching
26.	Happy Valley	Local		CHECK Work Party Briefing Form completed
27.	Happy Valley	Local		Freds Personnel to RELEASE CODE with TSO
28.	Happy Valley	Local		CHECK Restoration Certificate received from Harry Personnel
29.	Happy Valley	Local		CHECK all personnel clear
30.	Happy Valley	Local		REMOVE all working earths & ropes
31.	SMSC	Local		TSO to REQUEST CLEARANCE to PROCEED from DNC

32.	Happy Valley	Local	REMOVE earths A5208 side of A5210 (Main Earth)
33.	Happy Valley	Local	REMOVE earths A5208 side of A5209 (Main Earth)
34.	Happy Valley	Local	REMOVE earths A5209 side of A5208 (Main Earth)
35.	Happy Valley	Local	OPEN & LOCK TF earthing switch A6636E (Main Earth)
36.	Happy Valley	Local	CLOSE & LOCK A5208 & REMOVE DO NOT OPERATE SIGN/TAG
37.	Happy Valley	Local	REMOVE DO NOT OPERATE SIGN/TAG at A5209
38.	Happy Valley	Local	CLOSE & LOCK A5210 & REMOVE DO NOT OPERATE SIGN/TAG
39.	Happy Valley	Local	UNLOCK A6636 make operative & REMOVE DO NOT OPERATE SIGN/TAG
40.	SMSC	Local	TSO to OBTAIN PERMISSION from NEMMCO for restoration to proceed
41.	Happy Valley	Local	CHECK No 3 OLTC on tap 3
42.	Happy Valley	Supervisory	OPEN CB6523
43.	Happy Valley	Supervisory	OPEN CB6521
44.	Happy Valley	Supervisory	CLOSE A6636
45.	Happy Valley	Supervisory	CLOSE CB6523
46.	Happy Valley	Supervisory	CLOSE CB6521
47.	Happy Valley	Local	CHECK Nos 2, 3 & 4 OLTCs on the correct tap
48.	Happy Valley	Supervisory	CLOSE CB5256
49.	Happy Valley	Local	CHECK Nos 2, 3 & 4 OLTCs in NORMAL operating mode
50.	Happy Valley	Local	ADVISE TSO after operations completed
51.	SMSC	Local	TSO to ADVISE DNC restoration completed

A4 Customer interface switching

1.	TIPS B	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
2.	SMSC	Local	TSO to OBTAIN PERMISSION from AEMO for isolation to proceed
3.	TIPS B	Local	LIAISON OFFICER to CHECK with TIPS B AUC Personnel that all internal switching has been carried out as required
4.	TIPS B	Supervisory	OPEN CB BC4
5.	TIPS B	Supervisory	OPEN CB BW4
6.	TIPS B	Supervisory	OPEN BC4E
7.	TIPS B	Supervisory	OPEN BW4W
8.	TIPS B	Local	LOCK BC4E inoperative & AFFIX DO NOT OPERATE SIGN/TAG
9.	TIPS B	Local	LOCK BW4W inoperative & AFFIX DO NOT OPERATE SIGN/TAG
10.	TIPS B	Local	SURVEY all conductors and equipment in and adjacent to the working positions, note all live parts and advise all Personnel on the site.
11.	TIPS B	Local	Prepare Work Party Briefing Form and carry out briefings as required.
12.	TIPS B	Local	LIAISON OFFICER to ISSUE Isolation Certificate to TIPS B AUC Personnel
13.	TIPS B	Local	ADVISE TSO on completion of the above items & OBTAIN PERMISSION TO PROCEED
TO RESTORE TO NORMAL			
14.	TIPS B	Local	CARRY OUT switching briefing and ADVISE TSO before commencing switching
15.	TIPS B	Local	CHECK Work Party Briefing Form completed
16.	TIPS B	Local	LIAISON OFFICER to OBTAIN Restoration Certificate from TIPS B

				AUC Personnel
17.	TIPS B	Local		CHECK all personnel clear
18.	TIPS B	Local		UNLOCK BW4W make operative & REMOVE DO NOT OPERATE SIGN/TAG
19.	TIPS B	Local		UNLOCK BC4E make operative & REMOVE DO NOT OPERATE SIGN/TAG
20.	SMSC	Local		TSO to OBTAIN PERMISSION from NEMMCO for restoration to proceed
21.	TIPS B	Supervisory		CLOSE BW4W
22.	TIPS B	Supervisory		CLOSE BC4E
23.	TIPS B	Supervisory		CHECK BG4 OPEN
24.	TIPS B	Supervisory		CLOSE CB BW4
25.	TIPS B	Supervisory		CLOSE CB BC4
26.	TIPS B	Local		ADVISE TSO after operations complete

Appendix B SWOBS Abbreviations

SHORTCUT	REVERSE SHORTCUT	TEXT
AAP		ADVISE all Personnel on site that (enter equipment) are to be energised using CB****
AED		ADD Earth Recording Document
ATA	ATB	ADVISE TSO after operations completed
ATB	ATA	ADVISE TSO before commencing
ATC		ADVISE TSO on completion of the above items & OBTAIN PERMISSION TO PROCEED on completion of work party briefing
ATPM	RTPM	APPLY temporary protection settings as per TPM####
CA	OA	CLOSE A****
CA@	OA@	CLOSE A**** at (substation)
CAE		CHECK A to E received from ENSA Project Officer (enter name) for energising (enter equipment) using CB****
CALI		CHECK A**** locked inoperative & DO NOT OPERATE SIGN/TAG AFFIXED
CAO		CHECK A**** OPEN
CAS	OAS	CLOSE A**** by Supervisory
CAS@	OAS@	CLOSE A**** by Supervisory at (substation)
CASI		CHECK all Secondary Isolations restored and OLTCs in a suitable condition for restoration
CCB	OCB	CLOSE CB****
CCB@	OCB@	CLOSE CB**** at (substation)
CCBC	CCBO	CHECK CB**** CLOSED
CCBC@		CHECK CB**** CLOSED at (substation)
CCBO		CHECK CB**** OPEN
CCBS	OCBS	CLOSE CB**** by Supervisory
CCBS@	OCBS@	CLOSE CB**** by Supervisory at (substation)
CE	OE	CLOSE E****
CISSP		CHECK isolation completed on SSP****

CLA	OLA	CLOSE & LOCK A****
CLA@	OLA@	CLOSE & LOCK A**** at (substation)
CLAR	OLAA	CLOSE & LOCK A**** & REMOVE DO NOT OPERATE SIGN/TAG
CLAR@	OLAA@	CLOSE & LOCK A**** & REMOVE DO NOT OPERATE SIGN/TAG at (substation)
CLESOL		CHECK line earthing switch A****E OPEN & LOCKED
CLESOL@		CHECK line earthing switch A****E OPEN & LOCKED @ (substation)
COM		COMMISSION RESTORE
COPT		CARRY OUT Protection Tests
COPT@		CARRY OUT Protection Tests at(substation)
COSI		CARRY OUT Secondary Isolations as required
CPC		CHECK all personnel clear
CPR		CHECK No # TF protection relays reset
CPS		CHECK all Protection in Service
CVR		CHECK all vehicle access barriers replaced.
CVT	CVT	CLOSE all VT# LV CB's & REMOVE DO NOT OPERATE SIGN/TAG
IIC	ORC	ISSUE Isolation Certificate to ***** personnel/the contractor and request workparty briefing be undertaken prior to commencing their work
JOAK		J***J ADVISE
LAI		LOCK A**** inoperative
LAI@		LOCK A**** inoperative at (substation)
LAIA	UA	LOCK A**** inoperative & AFFIX DO NOT OPERATE SIGN/TAG
LAIA@	UA@	LOCK A**** inoperative & AFFIX DO NOT OPERATE SIGN/TAG at (substation)
LE	UE	LOCK E**** inoperative
NEW1		COMMISSION AND TEST
NEW4		CLOSE J***J CLOSE & LOCK
OA	CA	OPEN A****
OA@	CA@	OPEN A**** at (substation)
OAS	CAS	OPEN A**** by Supervisory

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OAS@	CAS@	OPEN A**** by Supervisory at (substation)
OCB	CCB	OPEN CB****
OCB@	CCB@	OPEN CB**** at (substation)
OCBS	CCBS	OPEN CB**** by Supervisory
OCBS@	CCBS@	OPEN CB**** by Supervisory at (substation)
OE	CE	OPEN E****
OIC	IIC	Obtain Isolation Certificate from ***** personnel/the contractor
OLA	CLA	OPEN & LOCK A****
OLA@	CLA@	OPEN & LOCK A**** @ (substation)
OLAA	CLAR	OPEN & LOCK A**** & AFFIX DO NOT OPERATE SIGN/TAG
OLAA@	CLAR@	OPEN & LOCK A**** & AFFIX DO NOT OPERATE SIGN/TAG at (substation)
OLLSAE	PDCLAE	OPEN & LOCK line earthing switch A****E (Main Earth)
OLLSAE@	PDCLAE@	OPEN & LOCK line earthing switch A****E at (substation) (Main Earth)
OLS		OPEN LS***
OLS@		OPEN LS*** at (substation)
OLSS		OPEN LS*** by Supervisory
OLSS@		OPEN LS*** by Supervisory at (substation)
ORC	IIC	OBTAIN Restoration Certificate from ***** personnel/the contractor
OVT	CVT	OPEN all VT# LV CB's & AFFIX DO NOT OPERATE SIGN/TAG
P&NA		PLACE No. # & # OLTC'S to NON AUTO
PC	PRC	(enter name) Personnel to CODE with TSO & OBTAIN PERMISSION TO PROCEED on completion of work party briefing
PDCD	PDOD	PROVE DEAD & CLOSE D**** & REMOVE DO NOT OPERATE SIGN/TAG
PDCLAE	OLLSAE	PROVE DEAD, CLOSE & LOCK line earthing switch A****E (Main Earth)
PDCLAE@	OLLSAE@	PROVE DEAD, CLOSE & LOCK line earthing switch A****E (Main Earth)
PDCLE		PROVE DEAD, CLOSE & LOCK line earthing switch E**** (Main Earth)
PDCTAE		PROVE DEAD, CLOSE & LOCK TF earthing switch A****E (Main Earth)

PDCTE		PROVE DEAD, CLOSE & LOCK TF earthing switch E**** (Main Earth)
PDEAsA	REAA	PROVE DEAD & EARTH A**** side of A**** (Main Earth)
PDEAsCB	REACB	PROVE DEAD & EARTH A**** side of CB**** (Main Earth)
PDECBSA	RECBA	PROVE DEAD & EARTH CB**** side of A**** (Main Earth)
PDEPC()	REPC()	PROVE DEAD & earth phase conductors (location) (Main Earth)
PDEPC()S	REPC()S	PROVE DEAD & earth phase conductors (location) (Supplementary Main Earth)
PDEtsA	RETA	PROVE DEAD & EARTH No.# T/F side of A**** (Main Earth)
PDEtsD	RETD	PROVE DEAD & EARTH No.# T/F side of D**** (Main Earth)
PDEWE	RER	PROVE DEAD & ERECT WORKING EARTHS AND RECORD THEIR LOCATION prior to commencing work within the area bounded by MAIN EARTHS
PDOD	PDCD	PROVE DEAD & OPEN D**** & AFFIX DO NOT OPERATE SIGN/TAG
PLA@	PLNA@	PLACE (Line) AUTO RECLOSING to ON/AUTO at (substation)
PLAS@	PLNAS@	PLACE (Line) AUTO RECLOSING to ON/AUTO by Supervisory at (substation)
PLNA@	PLA@	PLACE (Line) AUTO RECLOSING to OFF/NON AUTO at (substation)
PLNAS@	PLAS@	PLACE (Line) AUTO RECLOSING to OFF/NON AUTO by Supervisory at (substation)
PNA		PLACE No. # OLTC to NON AUTO & note riding tap
PO		PLACE No. # OLTC to OFF & AFFIX DO NOT OPERATE SIGN/TAG
PON	POT	PLACE OLTC test switch to NORMAL
POT	PON	PLACE OLTC test switch to TEST
PPSA	PPSR	PLACE all protection switches for No # TF to OFF & AFFIX DO NOT OPERATE SIGN/TAG
PPSR	PPSA	PLACE all protection switches for No # TF to ON & REMOVE DO NOT OPERATE SIGN/TAG
PRC	PC	***** Personnel to release CODE with TSO
PT&		PLACE No. # OLTC to NON AUTO on the same tap as No # & # OLTC's & REMOVE DO NOT OPERATE SIGN/TAG
REAA	PDEAsA	REMOVE earths A**** side of A**** (Main Earth)
REACB	PDEAsCB	REMOVE earths A**** side of CB**** (Main Earth)

RECBA	PDECBSA	REMOVE earths CB**** side of A**** (Main Earth)
REPC()	PDEPC()	REMOVE earths from phase conductors (location) (Main Earth)
REPC()S	PDEPC()S	REMOVE earths from phase conductors (location) (Supplementary Main Earth)
RER	PDEWE	REMOVE all working earths & ropes
RETA	PDETSA	REMOVE earths No.# T/F side of A**** (Main Earth)
RETD	PDETSD	REMOVE earths No.# T/F side of D**** (Main Earth)
ROPE	RER	ROPE OFF WORKING AREA AND SURVEY all conductors and equipment in and adjacent to the working positions, note all live parts and advise all personnel on the site.
RTPM	ATPM	RESTORE temporary protection settings to NORMAL as per TPM####
RVB		REMOVE vehicle access barriers within the defined Work Area as required and advise all personnel on site.
SRVY		SURVEY all conductors and equipment in and adjacent to the working positions, note all live parts and advise all personnel on the site.
SSS		INSTALL D**** D****
TA()		TSO to ADVISE (enter customer name)
TAD	TCPD	TSO to ADVISE DNC restoration completed
TAPN	TCPN	TSO to receive advice from DNC that Part # of NSP#### is completed
TCPD	TAD	TSO to REQUEST CLEARANCE to PROCEED from DNC
TCPN	TAPN	TSO to request DNC to carry out Part # of NSP####
TPNI	TPNR	TSO to OBTAIN PERMISSION from AEMO for isolation to proceed
TPNR	TPNI	TSO to OBTAIN PERMISSION from AEMO for restoration to proceed
UA	LAIA	UNLOCK A**** make operative & REMOVE DO NOT OPERATE SIGN/TAG
UA@	LAIA@	UNLOCK A**** make operative & REMOVE DO NOT OPERATE SIGN/TAG at (substation)
UE	LE	UNLOCK E**** & make operative

NOTES

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