energex
Part of Energy Queensland

Operating Practices Manual

Approved by: Manager Network Operations Standards & Engineering

Amendment Record:

13 May 2022

Version 5

All sections: The Electrical Safety Rules now supersedes the OPM in relevant sections. Where the OPM has been superseded, the relevant section has been removed and the section header has been watermarked. Where the section is still current it has been left.

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8 June 2018
Version 4.9d

All sections: Major change – New Earthing Document:
References to earthing in this document now superseded by RED 01732 – Earthing of High Voltage Electrical Apparatus for the Protection of Personnel.

Section 2: Minor changes:
Section 2.14.2 modified to reflect changes to bypassing PMRs with ABS. The likelihood of EF trip occurring due to downstream loads was evaluated. This resulted in the risk based decision to disable only SEF where a bypass switch is present. This also removes the need for PMPOs to be on site to disable EF. This should be reflected by the paralleling box (SE only).

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14 February 2017
Version 4.9c

Section 6: Minor changes:
Section 6.2 Not current, see RED 01274 Operating Practices – Manual Reclosing.

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02 January 2017
Version 4.9b

Section 2: Minor changes:
Section 2.28 Not current, see RED 01455 Operating Practices – Works Involving the Energex Low Voltage Network.

Section 15: Major Change - entire section removed.
Not current, see RED 01455 Operating Practices – Works Involving the Energex Low Voltage Network.

30 July 2014
Version 4.9a

Contents: New preamble added to contents page.

Section 2: Minor changes:
Section 2.8 incorporated into S2.5. S 2.8 removed as redundant.
Requirement to check switches within work area only. (2.5).
Phasing requirements clarified. Use of VTs and secondary measurement devices approved in certain circumstances. (2.10).
Disable SEF on single phase UG switching over 1km. (2.13).
Ferroresonance section updated to include reference to single phase OH links (Flying Shackles) (2.17).
Switching of VTs to prefer LV isolation. (2.24).
New section on VTs Associated with ACRs (2.24.1)
New section on Combined HV and LV Switching (2.28)
New section on Maintaining the Integrity of Isolation Points (2.29)

Section 12: Major Change - entire section updated.
Key changes include:
Introduction of Isolation Notice and Proximity Clearance
Energex permits no longer issued to non Energex personnel.
Customer responsible for own isolation and safe system of work.

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19 August 2011
Version 4.9

Section 0: Additions to responsibilities of Commissioning Coordinator role.
Additions to responsibilities of Applicant and LV Outage Officer role.
Introduce new definition and responsibility for LV Outage Coordinators.
Introduce new definition for ENC.

Section 2: Correction to Figure 2.18.12
Remove SSNSD Non Withdrawable Circuit breakers as special case Approved Isolation Points (Table 2.1)
Clarified the work restrictions when performing work on a NER (2.28)

Section 6: Updated Patrolling Faulted Feeders (6.4) to include patrolling procedures following the operation of a protective device (6.4.2 & 6.4.9).
Minor Formatting Changes

Section 11: Introduce requirement for plant to be correctly labelled before Commissioning. (11.4.5)
Modify Diagram 11.2 to reflect requirement for AE when commissioning plant with Control Box.

Section 15: Entire section updated and reworded.

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05 November 2010
Version 4.8

Section 0: Remove reference to “Live and Dead Board” in Definitions section. (0.2)
Changed the definition for Cursory Patrol and Operational Patrol in Definitions section. (0.2)

Section 2: Reference for Checking Switches after Remote Operations (2.6) modified.
Wording change under Actions to Avoid Ferroresonance (2.18.3.1)
Added a new device in the Switch Break Rating table (2.23)

Section 4: Added a new pin item in the Operating Pin Codes, The Code table (4.1.1)

Section 6: Changed the definition of Cursory Patrol and Operational Patrol throughout the section.

Section 11: Re-introduce commissioning using an Access Permit in certain circumstances. (11.4.3.4)

Section 12: Section numbering updated.

1 June 2010
Version 4.7

Section 0:	Responsibilities and Definitions updated to reflect changes to Section 11.
Section 2:	Temporary Isolation Points Installed by Live Line (2.1.3) modified.
Section 4:	Modifications to remote control switching for switching Coordinators (2.5.3) Black Pin definition modified to display Not Electrically Connected electrical apparatus. Reformat section Additional section titled the play pin code.
Section 6:	Amendment made to Notes for Fig 6.1.1 (Forward Scopers)
Section 7:	Projects Involving new secondary systems work and commissioned plant (7.10.1). A new Work Activity and Work Clearance Method table included.
Section 10:	Remove Section Disconnecting and Recovering Electrical Apparatus using an Access Permit (included in Section 11) and modify Requirements to isolate a RMU (10.2.1).
Section 11:	A Complete rewrite for Commissioning / Decommissioning procedures. Introduce the term Not Electrically Connected into the OPM.
Section 14:	Update section14.4.2, 14.5 1and 14.6 Emergency Work. Reinforce the requirement to confirm the recipient of the RB work authority has the appropriate authorisation.
Section 15:	Modifications made to section 15.2.4 required conditions when energising new LV electrical apparatus associated with Not Electrically Connected HV electrical apparatus.
Appendix A:	A Complete rewrite for Commissioning / Decommissioning examples Examples of forms modified. New Decommissioning Notice attachment A form.
Appendix B:	New Section – Commissioning Programs.
Appendix C:	New Section - Typical Examples for LV electrical apparatus associated with HV Not Electrically Connected Electrical Apparatus.

14 June 2009
Version 4.6

Section 1: 110/132kV Siemens Type 8DN8 GIS added.

Section 2: Live Line Temp Isolation Points not in the same span as work area added (2.1.3).

Section 10: Disconnecting and Recovering Electrical Apparatus Using an Access Permit.
Oil RMU Fuse Replacement Procedures added (10.2.3). This section will replace Safety Alert 20-08
Requirements to isolate a RMU added (10.2.2). This section will replace Safety Alert 16C-07

Section 15: Complete rewrite due to the introduction of Low Voltage De-energisation Permit.

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5 August 2008
Version 4.5

Section 3: Update to Training requirements for SOA

Section 7: Clarify the requirements when working on Non commissioned protection schemes (Section 7.8)

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19 June 2008
Version 4.4

General Entire document modified to comply with release of SAHV including:

- References to HVIA replaced by SAHV
- References to Test Dead replaced by Test De-energised
- References to Form 1174 removed

Section 6: Area Troubles fig 6.3 and 6.4 added.

Section 9: This Section Removed from OPM (replaced by Equipment Operating Manual).

Section 10: Work on a PT using form 1174 removed.

Section 11: Commissioning with Form 1174 removed.

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28 June 2006
Version 4.3

Section 9: Date for JKSS removed from service changed.
Additional operating instructions regarding earthing of switch fuse cable for:

- Reyrolle JKSS
- M.I. Type VL/OD
- L & C R/ETV2 and Type J
- L & C O/ETV2
- Reyrolle TO1X5B

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6 March 2006
Version 4.2

Section 3: Addition of Switching Authorisation Flow Chart

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07 December 2005
Version 4.1

Section 4: Revised operating panel designations
Section 6: Updates to Wires Down and Manual Reclose Policy
Section 9: Clarification of which RMUs require test probes
Section 10: Update to 11 kV Mobile Generator connection practice

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26 August 2005
Version 4.0

Section 9:
• New page layout
• Addition of “Accessing Feeder Cable Test Points” section
• Updated operating instructions for Brown Boveri and Reyrolle JKSS
• Addition of photographs of various test probes.

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12 November 2004
Version 3.0

Section 3: Reauthorisation period extended to three years.

Section 4: ‘B’ added to pink pins to help differentiate them from faded red pins

Section 9: Corrections to operating instructions for ABB SDAF ring main units and switch fuse units.

Section 10: Section 10.6 updated to cover new 11 kV mobile generators.

Section 11: A switching sheet is now required for all verbal commissioning and decommissioning.

Section 15: Clarification of Low voltage switching sheet requirements. A switching sheet is required for working on and commissioning of streetlight circuits.

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19 April 2004
Version 2.0

Section 6: Minor text edits. References to notes 4 and 5 corrected on Figure 6.2.1.

Section 10: Connection/Disconnection requirements for 11 kV mobile generator included.

Section 11: Additional commissioning and de-commissioning methods included.

Section 14: Minor text edits. Incorrect references in section 14.5 fixed. All references to section 14.3 changed to 14.4.

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11 September 2003
Version 1.0

Initial issue of Operating Practices Manual as a BMS document. The main changes from the previously issued (A5 format) document are:

Section 2: Revisions to operating practices associated with 110/132 kV Air Break Disconnectors.

Section 5: Changes to auditing and document retention requirements.

Section 6: Urgent rescue procedures associated with life threatening situations reviewed.
All isolation to be via an approved isolation point.
MDO procedures and associated flowchart reviewed.

Section 7: Completely revised as a result of recent secondary systems incidents.

Section 8
Clarification provided on:

- the application of portable earths to the bottom of expulsion drop-out fuses
- the handling of portable earths
- the application and removal of test leads.

Section 11: Commissioning/Decommissioning procedures reviewed. An Authority to Energise "AE" is now required for all commissioning (except for pole transformers under existing mains).

Section 14: Changes to auto-reclose suppression requirements particularly in relation to PMRs.

Section 15: General review of section to incorporate changes suggested by users.

INTRODUCTION

The ***Operating Practices Manual (ECM 3057620)*** contains policies and requirements associated with the practical operation of the Energex transmission and distribution networks.

The OPM is a living document which reflects progress in legislation, technology and systems.

To maintain currency, this document is continually reviewed and where appropriate new versions are released. The release of versions and amendments will be deployed and be made available on the Network Operations Standards intranet site.

This document is UNCONTROLLED when printed or downloaded. It is important that users assure themselves they are using the current version, including reference to any amendments when appropriate.

Network Operations Standards welcomes suggestions for improvement in this document and encourages users to notify us of any apparent inaccuracies or ambiguities. Please direct any comments to the Network Operations Standards email address netopsstandards@energyq.com.au.

Interpretation

If any user considers the content uncertain, ambiguous or otherwise in need of interpretation, in the interests of consistency they should seek advice from the Network Operations Standards department.

Section	Title	Date
0	Responsibilities and Definitions Refer to Switching & Access Authorisations & Electrical Safety Rules	09/08/2011
~~1~~	~~Switching Logic~~ Refer to Operating Practices – Standard Schedules	14/06/2009
~~2~~	~~Switching Procedures~~ Refer to Electrical Safety Rules	08/06/2018
3	ENERGEX HV Operating Authorisation Scheme Refer to Switching & Access Authorisations	06/04/2008
~~4~~	~~Operating Diagrams~~ Refer to UDMS Symbology Master Document	05/11/2010
~~5~~	~~Operational Audits~~ Refer to Electrical Safety Rules	27/05/2003
6	Fault Management	14/02/2017
7	Work Involving Secondary Systems	02/03/2010
~~8~~	~~Field Switching Practices~~ Refer to Electrical Safety Rules, appropriate Work Practices & Training	15/07/2003
~~9~~	~~*Section Intentionally spare in this Issue*~~	20/06/2008
~~10~~	~~HV Network Repair and Maintenance~~ Refer to Electrical Safety Rules	15/03/2010
11	HV Commissioning/Decommissioning Procedures	09/08/2011
~~12~~	~~Switching Involving Customers~~ Refer to Electrical Safety Rules	30/07/2014
~~13~~	~~Access for Non-Electrical Recipients~~ Refer to Electrical Safety Rules	27/05/2003
~~14~~	~~Non-Access High Voltage (Overhead & Substation) Line Work~~ Refer to Electrical Safety Rules	30/11/2009
~~15~~	~~Works Involving Low Voltage~~ Refer to Operating Practices – Work involving the Energex Low Voltage Network	~~09/08/2011~~
Appendix A	Examples of HV Commissioning/Decommissioning Procedures	24/03/2010
Appendix B	Typical examples of HV Commissioning Plans	27/11/2009
Appendix C	Typical Examples for LV electrical apparatus associated with HV Not Electrically Connected Electrical Apparatus	17/12/2009

External Related Documents

Doc #	Title	Date
ECM 6503074	Electrical Safety Rules	13/05/2022
ECM 3064895	Operating Practices – Manual Reclosing	18/07/2017
ECM 2953763	Operating Practices – Works Involving the Energex Low Voltage Network	16/01/2017

0.1.14 Commissioning Coordinator - Authorisation Code CC

0.1.14.1 Commissioning

Where applicable the Commissioning Coordinator will:

- ensure that Not Electrically Connected electrical apparatus is disconnected from the commissioned system by an approved method.
- ensure where appropriate, that Not Electrically Connected electrical apparatus is suitably earthed and appropriate other precautions are in place prior to the issue of any Construction Authorities or Test Authorities.
- negotiate commissioning requirements with the Outage Coordinator and all work/test groups
- ensure the System Alteration Advice is prepared in advance of the commissioning. (forms 205 & 206)
- prepare the Authority to Energise and record on that AE all Construction Authorities and/or Test Authorities and/or Access Permits and/or Test Permits associated with that AE
- prepare and issue the Commissioning Programme
- determine Construction/Test authority and/or Access/Test Permit requirements
- ensure all relevant tests on electrical apparatus have been completed prior to authorisation of the Authority to Energise (AE). eg (a)the correct Relay Setting Requirements (RSRs) and associated protection relays have been installed and applied, (b) required cable earthing, transformers, and HV switchgear tests
- ensure other precautions not required are removed prior to the issue of the authority to energise AE
- ensure earths not required are removed, and record condition of earthing the Authority to Energise.
- endorse the Authority to Energise AE form (or appoint a delegate to do so)
- ensure that all necessary operating, office and computer records associated with the commissioning are updated.

0.1.14.2 Decommissioning

- negotiate decommissioning requirements with the Outage Coordinator
- programme the decommissioning of the electrical apparatus
- prepare and distribute a Decommissioning Notice "DN"
- prepare and distribute a Decommissioning Notice Attachment A as required
- ensure where applicable, that Not Electrically Connected electrical apparatus is suitably earthed and other precautions are in place prior to the issue of Decommissioning Notice Attachment
- ensure that all necessary operating, office and computer records associated with the decommissioning are updated

Refer to Switching and Access Training & Authorisations - R317

3 ENERGEX Operational Authorisation Scheme

3.1 Policy

All roles listed in section 3.3 shall be authorised.

ENERGEX shall maintain a register of all persons who are authorised to perform operating work or gain access to ENERGEX's network.

The awarding of operational authorisation(s) to individuals shall be at the sole discretion of the Work Practices Manager.

Operational authorisations shall last for a period of three years and all individuals will be re-assessed as competent before being re-authorised. It is the responsibility of the work group manager to make arrangements to ensure operational authorisations are maintained.

The Work Practices Manager will approve assessors. They will have extensive experience in the role they are assessing; and where practical assessment is required, have successfully completed the workplace assessor's course.

The following roles shall receive training in the Safe Access for High Voltage (SAHV) Procedures:

- Applicant
- Switching Sheet Writer
- Switching Sheet Checker
- Switching Sheet Authoriser
- Individual of Work Group

In ENERGEX, the switching sheet checker, switching sheet authoriser and outage coordinator roles are combined into one authorisation - the outage coordinator.

Switching operator and recipient authorisations are issued on the basis of the asset owner. For example, if a person carries out 132kV switching at an ENERGEX substation under the direction of the network switching centre (NSC), they require ENERGEX "S132" authorisation.

~~Authorisations issued to ENERGEX personnel by Powerlink and Queensland Rail are recorded in the ENERGEX authorisation register as "XR", and are restricted on the basis of location, voltage and possibly type of apparatus.~~

3.2 Responsibilities

Basic responsibilities for roles are specified in the SAHV procedures manual (Orange Book). However, ENERGEX requires further responsibilities that are detailed in section 0 of this manual.

3.3 ENERGEX Authorisations

The following roles are authorised in ENERGEX.

Authorisation Code	Role
~~RR~~	~~Restricted Recipient~~
~~SR~~	~~Recipient~~
~~SOA~~	~~Switching Operator's Assistant~~
~~ATO~~	~~Area Troubles Operator~~
~~OSO~~	~~Overhead Network Switching Operator~~
~~USO~~	~~Underground Network Switching Operator~~
~~SSC~~	~~Secondary Systems Checker~~
~~SPO~~	~~Substation Panel Operator~~
~~S33~~	~~Substation Switching Operator (to 33kV)~~
~~S132~~	~~Substation Switching Operator (to 132kV)~~
~~XR~~	~~Restricted Operator~~
A11	Outage Coordinator 11kV
A33	Outage Coordinator 11-33kV
A132	Outage Coordinator 11-132kV
C11	Switching Coordinator 11kV
C33	Switching Coordinator 11-33kV
C132	Switching Coordinator 11-132kV
CC	Commissioning Coordinator

~~3.3.1 Low Voltage Switching~~

~~No specific authorisations are issued for LV switching. The only requirements for individuals undertaking LV switching are:~~

- ~~the person is an electrical worker~~
- ~~the person is competent to undertake the task~~

3.4 Issue of New Authorisation(s)

The criteria for the issue of new operational authorisations are specified in this section 3.5. These are typically a combination of several requirements that may include:

- holding a current authorisation of some form
- completion of training modules (typically administered by Esitrain)
- completion of a practical component and assessment

The approval of operational authorisations is at the sole discretion of the Work Practices Manager, not simply on completion of training modules conducted by Esitrain.

For example, the process for attaining a new operational authorisation for overhead (OSO), underground (USO) and substations (S33/S132) authorisations is as follows:

- completion of required training modules as specified in section 3.5 (notes 1 & 4)
- practical field competency assessment (note 2 & 3)
- approval of authorisation by the Operating Standards & Compliance Manager (note 5)

Notes:

1. *Prerequisite requirements (eg. current recipient (SR) authorisation) will be mandated prior to enrolment in Esitrain training courses.*

2. *Prerequisite practical experience is mandated prior to field competency assessment.*

   It is the responsibility of coordinators to ensure that staff recommended for field competency assessment have sufficient practical experience and have an appropriate understanding of field switching practices (eg. assisted in an appropriate number of switching sheets for the role being assessed).

3. *Field competency assessment will be scheduled based on completion of required training by Esitrain and the requirements specified in note 2 above.*

   For those personnel with the prerequisite practical experience, on conclusion of required training, competency assessment will be scheduled by Esitrain and conducted by them immediately following completion of the training course.

   For those personnel <u>not</u> having the prerequisite practical experience, on conclusion of required training, a field competency assessment should be scheduled by the participant's coordinator in consultation with Esitrain.

   Field Competency Assessors will not be recommending participants they do not consider fully competent or who they believe have insufficient practical experience.

4. *Statements/certificates from any course involving ENERGEX Operational Authorisations will not be released until the participant has successfully completed a field competency assessment.*

5. *On successful completion of training and field competency assessment, a request for operational authorisation (form 2045) shall be forwarded by Esitrain to the Operating Standards Officer.*

3.5 Criteria for Issue of New Authorisations

The following criteria shall be applied (as a minimum) when assessing candidates for the issue of operational authorisations. The candidate must satisfy ENERGEX by providing sufficient evidence to prove that the criteria have been meet. No authorisation, other than switching operator's assistant (SOA) shall be issued to trainees.

~~3.5.1 Restricted Recipient (RR)~~

~~Criteria 1 - ENERGEX & Distribution System Awareness~~

~~Successfully complete the following training:~~

- ~~Operating the ENERGEX Network – An Introduction (M841).~~
- ~~Introduction to the Distribution Network (M842).~~

~~Criteria 2 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~HV Access Procedures for Non-Electrical Personnel (M171).~~

~~3.5.2 Recipient (SR)~~

~~Criteria 1 - Qualifications\Certifications~~

- ~~Hold a current Queensland electrical workers licence or equivalent.~~
- ~~Hold current rescue and resuscitation certification.~~

~~Criteria 2 – Safety~~

~~Successfully complete the following training:~~

- ~~Introduction to Electrical Safety Practices (M41).~~

~~Criteria 3 - ENERGEX & Distribution System Awareness~~

~~Successfully complete the following training:~~

- ~~Operating the ENERGEX Network – An Introduction (M841).~~
- ~~Introduction to the Distribution Network (M842).~~

~~Criteria 4 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~SAHV Procedures (M42).~~
- ~~Test & Earth HV Mains (M169).~~

~~3.5.3 Switching Operator's Assistant (SOA)~~

~~*Note. A trainee who has not completed at least six months of an apprenticeship or training program shall not be eligible for authorisation as a switching operator's assistant.*~~

~~Criteria 1 - Qualifications\Certifications~~

- ~~Hold current rescue and resuscitation certification.~~

~~Criteria 2 – Safety~~

~~Successfully complete the following training:~~

- ~~Introduction to Electrical Safety Practices (M41).~~

~~Criteria 3 - ENERGEX & Distribution System Awareness~~

~~Successfully complete the following training:~~

- ~~Operating the ENERGEX Network – An Introduction (M841).~~
- ~~Introduction to the Distribution Network (M842).~~

~~Criteria 4 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Teamwork in Switching.~~

~~Criteria 5 – Working Live~~

~~Successfully complete the following training (* or equivalent):~~

- ~~Working on Energised LV Equipment (M340)~~
- ~~Working on Energised LV Overhead Conductors (M341)~~
- ~~Working on Energised LV Underground cables and equipment (M342)~~
- ~~Working on Energised LV Electrical Installations (M343)~~
  ~~(* does not apply to non electrical personnel)~~

~~3.5.4 Area Troubles Operator (ATO)~~

~~Criteria 1 - Qualifications\Certifications~~

~~Hold a current Queensland electrical workers licence or equivalent.~~

~~Criteria 2 – Safety~~

~~Successfully complete the following training:~~

- ~~Introduction to Electrical Safety Practices (M41).~~

~~Criteria 3 - ENERGEX & Distribution System Awareness~~

~~Successfully complete the following training:~~

- ~~Operating the ENERGEX Network – An Introduction (M841).~~
- ~~Introduction to the Distribution Network (M842).~~

~~Criteria 4 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Resolving Area Troubles (M843)~~

~~3.5.5 Overhead Network Switching Operator (OSO)~~

~~Criteria 1 – Recipient Authorisation~~

- ~~Hold current Recipient (SR) authorisation.~~

~~Criteria 2 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Teamwork in Switching.~~
- ~~Resolving Area Troubles (M843).~~
- ~~Switching Operator Overhead (M845).~~

~~3.5.6 Underground Network Switching Operator (USO)~~

~~Criteria 1 – Recipient Authorisation~~

- ~~Hold current Recipient (SR) authorisation.~~

~~Criteria 2 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Teamwork in Switching.~~
- ~~Switching Operator Underground (M846).~~

~~3.5.7 Secondary Systems Checker (SSC)~~

~~Criteria 1 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Operating the ENERGEX Network – An Introduction (M841).~~
- ~~Introduction to the Distribution Network (M842).~~
- ~~Isolate Secondary Systems (M847).~~

~~3.5.8 Substation Panel Operator (SPO)~~

~~Criteria 1 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Operating the ENERGEX Network – An Introduction (M841).~~
- ~~Introduction to the Distribution Network (M842).~~
- ~~Substation Awareness (M204).~~
- ~~Teamwork in Switching.~~

~~3.5.9 Substation Switching Operator (S33)~~

~~Criteria 1 – Recipient Authorisation~~

- ~~Hold current Recipient (SR) authorisation.~~

~~Criteria 2 – UG Competencies~~

- ~~Satisfy all criteria required for the issue of Underground Switching Operator (USO) authorisation.~~

~~Criteria 3 - Operating Practices~~

~~Successfully complete the following training:~~

- ~~Substation Switching Operator Theory (M848).~~
- ~~Substation Operator Practical 11 – 33kV (M849).~~

~~**Substation Switching Operator (S132)**~~

~~**Criteria 1 – S33 Competencies**~~

- ~~Satisfy all criteria required for the issue of Substation Switching Operator (S33) authorisation.~~

~~**Criteria 2 - Operating Practices**~~

~~Successfully complete the following:~~

- ~~Substation Operator Practical Assessment – 110/132kV~~

~~**3.5.10 Restricted Operator (XR)**~~

~~**Criteria 1 – Recipient Authorisation**~~

- ~~Hold current Recipient (SR) authorisation.~~

~~**Criteria 2 - Operating Practices**~~

- ~~Undertake site/equipment specific training and be assessed as competent, applicable training to be determined by the Operating Standards Officer.~~

3.5.11 Outage Coordinator 11kV (A11)

Criteria 1 – Qualifications/Certifications

- Hold a current Queensland electrical workers licence or equivalent; or
- Hold a Degree, Diploma, Associate Diploma/Degree, or Certificate in Electrical Engineering.

Criteria 2 – Safety

Successfully complete the following training:

- Introduction to Electrical Safety Practices (M41).

Criteria 3 - ENERGEX & Distribution System Awareness

Successfully complete the following training:

- Operating the ENERGEX Network – An Introduction (M841).
- Introduction to the Distribution Network (M842).

Criteria 4 - Operating Practices

Successfully complete the following training:

- SAHV Procedures (M42).
- Interpret Protection Operations (NO10)
- 11kV Manual Switching Preparation (NO46).
- Write Switching Using DMS (NO35).
- Commissioning/Decommissioning Procedures (M47).
- Operate Delivery System Process (NO13).
- Manage Operational Support Computer Systems (NO14).
- Manage Storms (NO16).
- Operate Service Call Management System (NO38).

3.5.12 Outage Coordinator 11 - 33kV (A33)

Criteria 1 – A1 Authorisation

- Hold current Outage Coordinator 11kV (A11) authorisation.

Criteria 2 - Operating Practices

Successfully complete the following training:

- 33kV Switching (NO40).
- Manage Secondary Systems (NO23).
- Plan for Contingencies (NO24).
- Manage Network Risks (NO25).
- Use a Loadflow Program (NO26).

3.5.13 Outage Coordinator 11 - 132kV (A132)

Criteria 1 – A1 Authorisation

- Hold current Outage Coordinator 11- 33 kV (A33) authorisation.

Criteria 2 - Operating Practices

Successfully complete the following training:

- Write 110/132kV Switching (NO33).
- Distance Protection & Protection Signalling Systems (NO47).
- Work On Secondary Systems (NO22).

3.5.14 Switching Coordinator 11kV (C11)

Criteria 1 – A1 Authorisation

- Hold current Outage Coordinator 11 kV (A11) authorisation.

Criteria 2 - Operating Practices

Successfully complete the following training:

- Control 11kV Faults (M39).
- Manage Feeders, Transformers & Other Plant (NO17).
- Report Incidents & Faults (NO18).
- Manage 11kV Real Time Computer Systems (NO19).
- Manage Housekeeping Issues (NO20)
- Manage Alarms (NO21).
- Handle Customer Calls (NO41).

3.5.15 Switching Coordinator 11 – 33kV (C33)

Criteria 1 – A33 Authorisation

- Hold current Outage Coordinator 11 – 33kV (A33) authorisation.

Criteria 2 – C11 Authorisation

- Hold current Switching Coordinator 11kV (C11) authorisation.

Criteria 3 - Operating Practices

Successfully complete the following training:

- Manage Complex Network Faults – 33kV (N027).
- Manage Capacitors (NO29).
- Manage Under Frequency Emergencies (NO30).
- Manage Rotational Load Shedding (NO31).
- Manage POPS & VVR (NO32).

3.5.16 Switching Coordinator 11 – 132kV (C132)

Criteria 1 – A132 Authorisation

- Hold current Outage Coordinator 11 – 132kV (A132) authorisation.

Criteria 2 – C33 Authorisation

- Hold current Switching Coordinator 11 – 33kV (C33) authorisation.

Criteria 3 - Operating Practices

Successfully complete the following training:

- Manage Complex Network Faults – 110/132kV (N034).

3.5.17 Commissioning Coordinator (CC)

Criteria 1 - Qualifications

- Hold a current Queensland electrical workers licence or equivalent; or
- Hold a Degree, Diploma, Associate Diploma/Degree, or Certificate in Electrical Engineering.

Criteria 2 – Safety

Successfully complete the following training:

- Introduction to Electrical Safety Practices (M41).

Criteria 3 - ENERGEX & Distribution System Awareness

Successfully complete the following training:

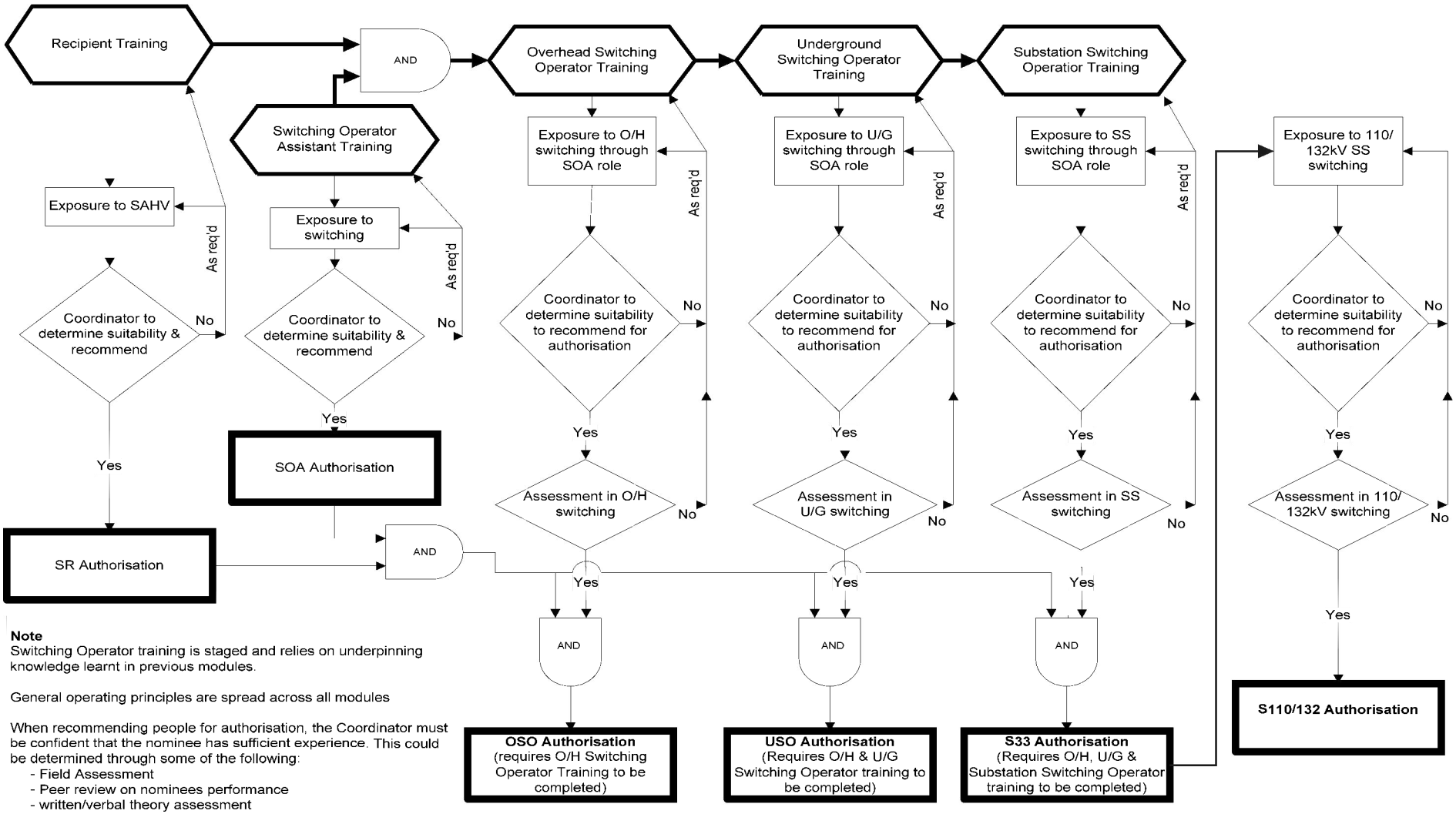
- Operating the ENERGEX Network – An Introduction (M841).
- Introduction to the Distribution Network (M842).

Criteria 4 - Operating Practices

Successfully complete the following training:

- SAHV Procedures (M42)
- Commissioning/Decommissioning Procedures (M47)

3.5.18 Switching Authorisation Flow Chart



Note
Switching Operator training is staged and relies on underpinning knowledge learnt in previous modules.

General operating principles are spread across all modules

When recommending people for authorisation, the Coordinator must be confident that the nominee has sufficient experience. This could be determined through some of the following:

- Field Assessment
- Peer review on nominees performance
- written/verbal theory assessment
- amount of exposure to equipment for authorisation

Prerequisites are strictly enforced for authorisations

Switching Authorisation Flow Chart

For ENERGEX employees

20 May 2005

3.6 Recognised Prior Learning/Skills

Applicants for new authorisations who consider that they have already successfully completed equivalent training (or have the necessary skills) may apply to the Operating Standards Officer for a full or partial exemption from the relevant criteria. Training completed not more than 12 months previously will generally be recognised.

Training completed more than 12 months prior to application will require a demonstration of skills/competency maintenance. The onus is on the applicant to provide sufficient evidence (for example a switching log) to satisfy the Operating Standards Officer. A competency assessment may be carried out.

3.7 Re-authorisation

3.7.1 General

Each person shall have carried out the duties of each of their roles. Specifically, persons within the three years (preferably at equal intervals) shall have, as a minimum performed duties as detailed in table 3.7.1.

All personnel shall submit a written statement, signed by their manager/department head. The statement shall verify that person is competent to be re-authorised and that practical experience equivalent to that listed in table 3.7.1 has been achieved. Form TS41 should be used for this purpose.

3.7.2 Examination

All personnel will be examined in SAHV/OPM theory before being reauthorised. A result of 90% or better shall be achieved before re-authorisation.

Authorisation	Practical Experience for Re-authorisation
SR, RR	Received five Access or Test permits for different jobs.
SOA	Assisted with five Switching Sheets.
ATO	Attended five Area Troubles.
SSC	Checked five Trip Isolation Sheets.
XR	As determined by the Network Operations Development Engineer
OSO, USO, SPO, S33, S132	Carried out five Switching Sheets of varying complexity, forward and reverse, for **any** of the authorisations held.
	Issued five Access/Test Permits (except SPO).
A11, A33, A132	Checked and authorised five Switching Sheets of varying complexity for **each** voltage for which they are authorised.
C11, C33, C132	Coordinated planned switching for five Switching Sheets of varying complexity for **each** voltage for which they are authorised
	Coordinated emergency switching on one occasion for **each** voltage for which they are authorised.
CC	Acted as the Commissioning Coordinator for five commissioning jobs

Table 3.7.1

A person being re-authorised as SR, OSO, USO, S33, A33 should have, during the three years:

- carried out five switching sheets
- issued five access or test Permits
- received five access or test permits for different jobs
- checked & authorised five 11kV switching sheets
- checked & authorised five 33kV switching sheets
- passed the SAHV/OPM theory examination

3.7.3 Practical Experience Not Achieved

If a person does not have the opportunity to comply with the requirements of section 3.6.1 during the three year period, then Operating Standards Officer will determine whether the person is re-assessed:

- for competence as for a new authorisation (section 3.4); or
- with supplementary testing (theory and/or practical).

3.7 Authorisation and the Authorisation Register

Requests for operational authorisation (form 2405NW) shall be forwarded to the Operating Standards Officer. Copies of all evidence gathered to satisfy the criteria for authorisation will be attached. The network operations development engineer will confirm that the requirements have been met, and then arrange for the update of the works authorisation management system (WAMS). All documentation received will be filed in a secure place for the duration of any authorisation.

6 Fault Management

6.1 Wires down

6.1.1 Background

Fallen wires may be alive. Even if they are de-energised, it is possible that they may become inadvertently re-energised. There are documented incidents where fallen wires have been re-energised by:

- incorrect isolation being issued (incorrect records)
- incorrect isolation being carried out (wrong switch operated, incorrect labelling)
- insufficient isolation being carried out (backfeeds through LV, arcing horns being left in)

6.1.2 Policy

Fallen wires that are either on the ground, or hanging at a low height such that they may be contacted by persons or vehicles can pose a hazard.

Actions shall be taken to make safe all fallen wires.

Make safe means to cut clear, break bridges or isolate the fallen wire in such a manner that there is no possibility of the wire being inadvertently re-energised from any source of supply, thereby placing the safety of any person at risk of receiving electric shocks should they accidentally come in contact with that wire. In addition, the wire must be made safe in such a manner that it visually appears safe to untrained personnel (i.e. the public).

6.1.3 Procedure

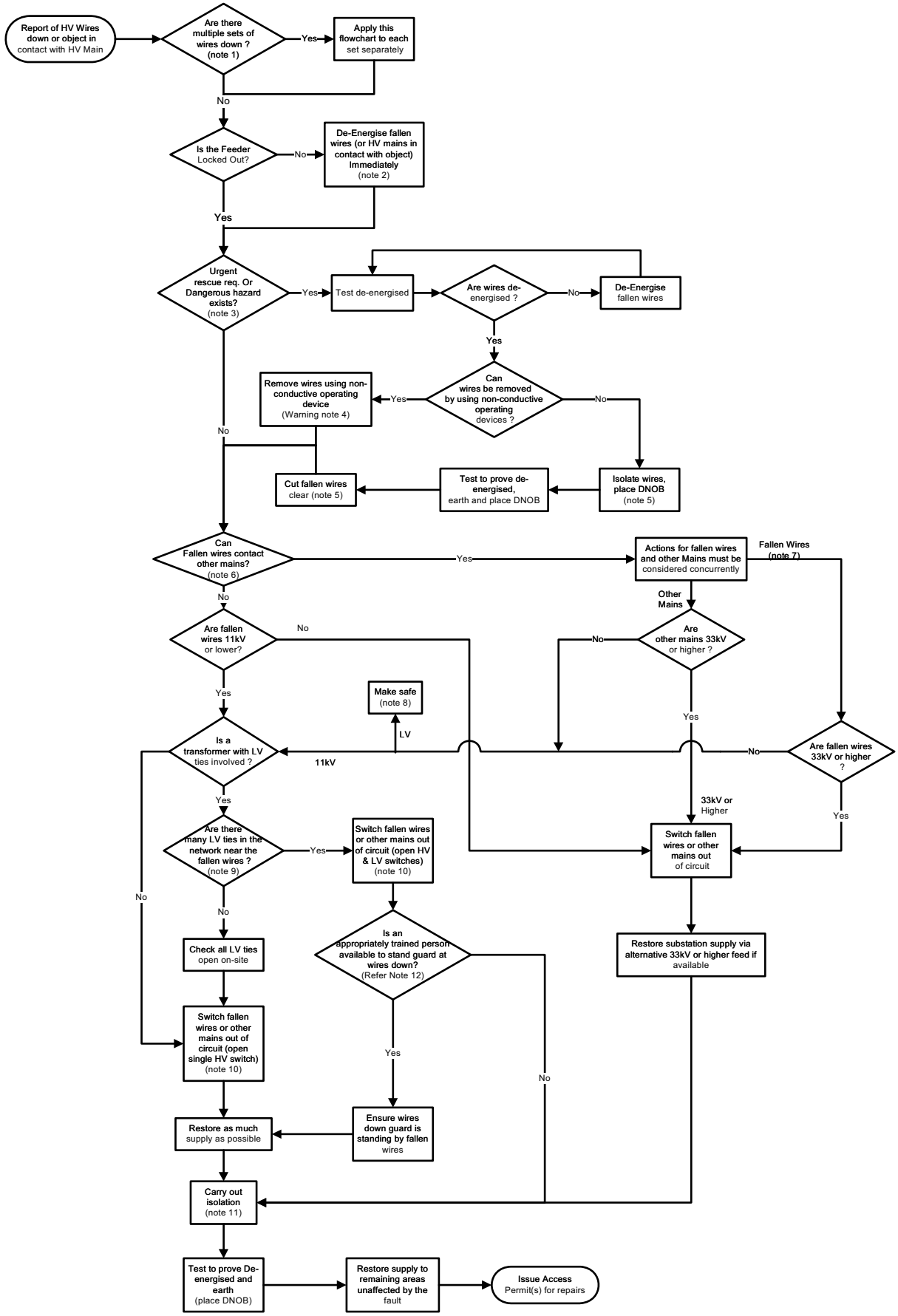
Following a report of wires down, checks shall be carried out to determine whether the wires are LV, HV, or some other type e.g. BBCC, TELSTRA.

If LV, then fallen wires should be made safe before supply is restored.

If HV, then the flowchart shown in figure 6.1.1 should be followed.

If "Other", take appropriate action to make safe, and contact the relevant authority.

Figure 6.1.1 Action Following Report of Wires Down or Object in Contact with Mains



Notes for Figure 6.1.1

1. No supply shall be restored until all sets of fallen wires on the feeder are considered.

2. The fallen wires should be de-energised as quickly as possible. If field switching is delayed, the feeder should be tripped remotely.

3. This applies to extreme emergency conditions where human life is at risk if rescue is delayed, e.g.. People are trapped in a crashed vehicle and urgent medical attention is required to save lives, or a dangerous hazard exists, e.g. Wires are down on a road and police/emergency services request immediate removal.

4. Exclusion zones shall be maintained at all times. The presence of other mains on site shall also be taken into account.

5. Ensure fallen wires are isolated by an approved isolation point.

6. Where possible, the presence of other mains should be determined by an on site visit. In situations where access is difficult, or protracted, and if accurate information is available, then system records may be used.

7. If the fallen wire is an overhead earth wire, then all wires in close proximity are to be treated as fallen wires.

8. For neutral mains on the ground the act of cutting clear requires the neutral network to be configured so that a path exists for a return via a ring system(s) to the source of supply (i.e. the distribution transformer neutral). If this can not be achieved then an LV tie is to be closed, thus ensuring continuity of the neutral conductor. If neither of these can be done, all supply past the fallen neutral wire needs to be isolated until the neutral conductor is made solid again.

9. Select the most efficient approach based on assessment of time required to check all LV ties open.

10. If an air break switch is used, the Switching Coordinator shall ask the Switching Operator to double check that all the arcing horns are clear.
    Verify that LV area where the HV wire is down will not be energised during restoration.

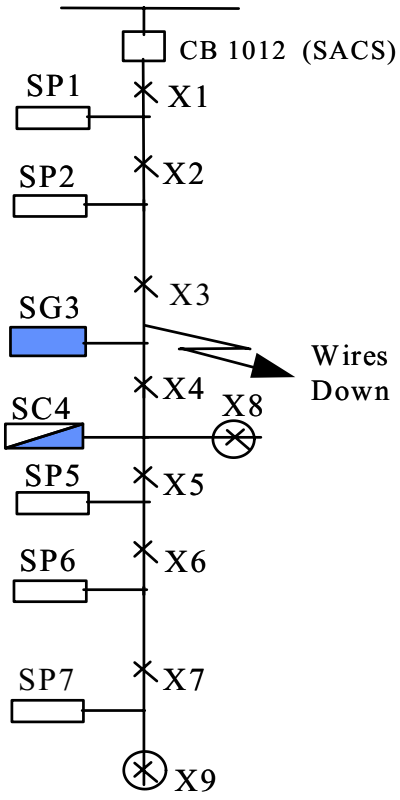
11. Ensure that DNOBs are placed on approved isolation points that have already been used in the switching.

12. In situations where extensive damage has been experienced, a forward scoper(s) may be utilised to determine the extent of damage.

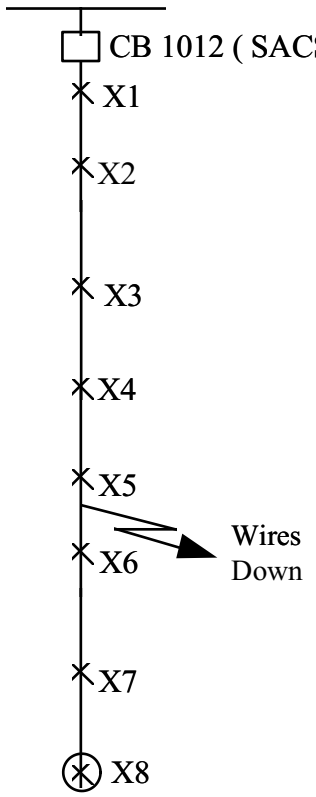
Prior to attempting any re-energisation, the Switching Coordinator shall determine the likelihood of the risk of electrical apparatus being energised

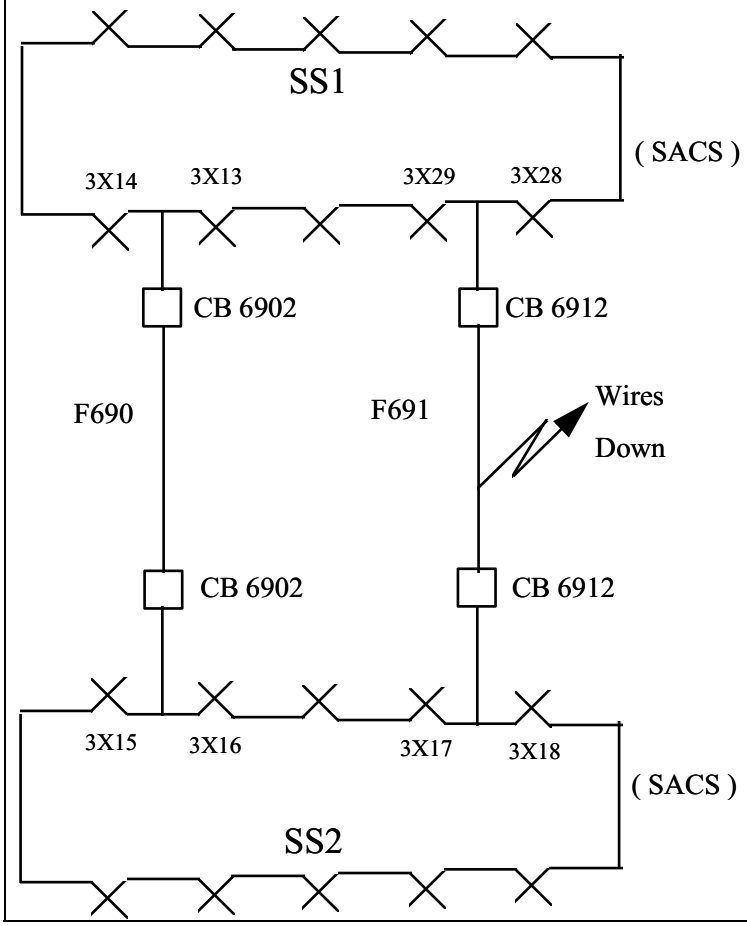
Consideration should be given to geographic locations where access is difficult or limited.

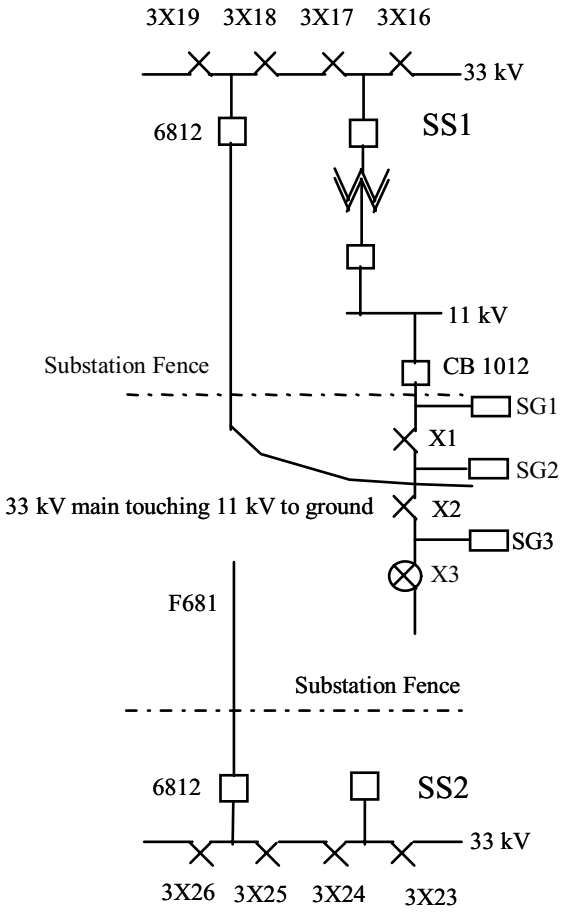
6.1.4 Examples of Application of Wires Down Procedure

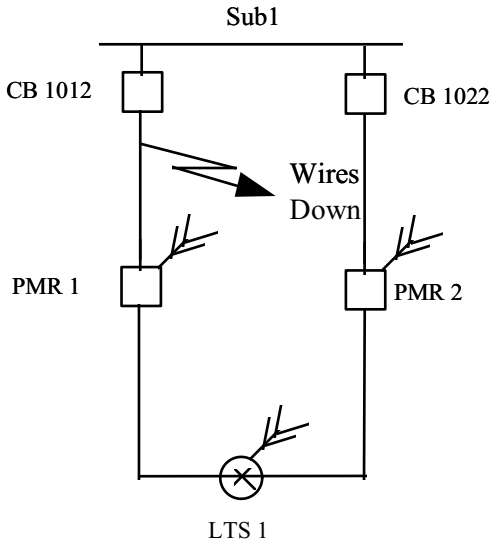
EXAMPLE 1	TYPICAL SWITCHING	
	OPTION 1 (GUARD AVAILABLE)	OPTION 2
• 11 kV wires down at 1 location • Feeder locked out • Many LV ties involved • 11 kV main in contact with LV mains supplied from SG3  	1. Open X3 & Place DNOB (confirm arcing horns clear) 2. Open X4 & Place DNOB (confirm arcing horns clear) 3. Open LV Switch SG3 & Place DNOB 4. Ensure affected LV mains are switched out of circuit 5. Whilst in communication with appropriately trained person guarding wires down site, Close CB1012 6. Whilst in communication with appropriately trained person guarding wires down site, Close X8 7. Test to Prove De-energised & Earth fallen wires & Place DNOB 8. Issue Access Permit	1. Open X3 & Place DNOB (confirm arcing horns clear) 2. Open X4 & Place DNOB (confirm arcing horns clear) 3. Open LV Switch SG3 & Place DNOB 4. Ensure affected LV mains are switched out of circuit 5. Test to Prove De-energised & Earth fallen wires & Place DNOB 6. Close CB1012 7. Close X8 8. Issue Access Permit

Note: ***The above example also pertains to double cable box 11 kV CB's (dual 11 kV feeders for 1 CB). The wire down on the faulted feeder (leg.) must be attended to in one of the above manners prior to restoring supply to the healthy feeder (leg.).***

EXAMPLE 2	**TYPICAL SWITCHING** *(Single HV Switch Isolation)*
• 11 kV wires down • Feeder Locked out • No other mains can contact the fallen wires • Many small transformers on the feeder • One LV tie exists between transformers on either side of X5 • No LV ties exist between transformers on either side of X6  	1. Check open on site LV tie across X5 and Place DNOB 2. Open X5 and Place DNOB 3. Confirm all arcing horns clear on X5 4. Close CB 1012 5. Check no LV ties exist across X6 6. Open X6 and Place DNOB 7. Confirm all arcing horns clear on X6 8. Close X8 9. Test to prove De-energised, Earth & Place DNOB on fallen wires 10. Issue Access Permit

EXAMPLE 3	**TYPICAL SWITCHING** ***(Total Loss of Substation Supply)***
• 33 kV wires down • 2 x 33 kV feeders locked out • Total loss of supply to SS2 • No other mains can contact the fallen wires • F690 is healthy to restore  	1. SS1 CB 6912 Check Open (via SCADA) 2. SS2 CB 6912 Check Open (via SCADA) 3. SS1 CB 6902 Close 4. SS2 CB 6902 Close 5. SS1 ABS 3X29 Open & Place DNOB 6. SS1 ABS 3X28 Open & Place DNOB 7. SS2 ABS 3X17 Open & Place DNOB 8. SS2 ABS 3X18 Open & Place DNOB 9. Test to prove De-energised, Earth & Place DNOB at SS1 or SS2 end of F691 10. Issue Access Permit

EXAMPLE 4	**TYPICAL SWITCHING** (GUARD AVAILABLE)
• 33 kV wire down touching 11 kV mains • 33 kV feeder locked out • 11 kV feeder locked out • Many LV ties involved  	1. SS1 CB6812 Check Open (via SCADA) 2. SS2 CB6812 Check Open (via SCADA) 3. SS1 CB1012 Check Open (via SCADA) 4. 11 kV ABS X1 Open Place DNOB (confirm arcing horns clear) 5. 11 kV ABS X2 Open Place DNOB (confirm arcing horns clear) 6. Open LV Switch SG2 & Place DNOB 7. Whilst in communication with appropriately trained person guarding wires down site, Close CB1012 8. Whilst in communication with appropriately trained person guarding wires down site, Close X3 9. SS1 33 kV ABS 3X19 Open Place DNOB 10. SS1 33 kV ABS 3X18 Open Place DNOB 11. SS2 33 kV ABS 3X26 Open Place DNOB 12. SS2 33 kV ABS 3X25 Open Place DNOB 13. Test to Prove De-energised, Earth, Place DNOB at SS1 and/or SS2 end(s) of F681 14. Test to Prove De-energised, Earth, Place DNOB 11 kV mains 15. Test to Prove De-energised, Earth, Place DNOB 33 kV mains 16. Issue Access Permit *Note: Items 4 through 8 & 9 through 12 inclusive can be carried out concurrently.*

EXAMPLE 5	**TYPICAL SWITCHING** ***(DSA Scheme)***
• 11 kV wire down between CB 1012 and PMR1 • No ties across PMR1 • SCADA control of remote switches • Refer to Table 2.1 Section 2 Sheet 1 OPM for approved isolation points  	1. Check 11 kV CB 1012 Open (via SCADA) 2. Trip PMR 1 (via SCADA) 3. Confirm PMR1 Open (via SCADA) 4. Make PMR2 non-auto 5. Close LTS1 (via SCADA) 6. Make PMR2 auto 7. Carry out isolation for access to repair fallen main

6.2 Manual Reclosing of ENERGEX Feeders

Following the lockout of a HV protective device (e.g. feeder CB, PMR, etc) on a feeder, the risks involved in attempting a manual reclose shall be considered.

6.2.1 Initial Manual Reclose

6.2.1.1 Policy

Where the risks to people and plant are considered low, then one manual reclose is permitted.

6.2.1.2 Procedure

The flowchart shown in Figure 6.2.1 should be followed prior to the application of the initial manual reclose of a locked out protective device.

If a wire down is reported or found during the procedure, Section 6.1 - Wires Down procedure takes precedent.

6.2.1.3 Manual Reclose ~~Policy~~

Before attempting one manual reclose, the switching coordinator shall:

- Check with staff responsible for receiving damage reports that no damage has been reported in the general area supplied by the feeder
- Have Line Fault Indicators checked at appropriate locations where this does not cause more than a 15-minute delay
- Ensure that all relay operations have been logged and relays reset (not required for CB's or reclosers under remote control)
- Ensure that the auto-reclosing is disabled on any protective device that could reclose onto the section of the feeder being energised
- Check that a minimum of 15 minutes has elapsed.
- Advise all staff associated with the fault, that supply is about to be restored. If any work group involved, no manual reclose attempt shall be commenced until all members of the work group have confirmed that they are clear of the line to be energised.
- If feasible*, advise major customers sensitive to supply disruptions regarding the pending reclose/fault location process.

* *During normal working hours, under non-urgent circumstances (i.e. not during storms or major emergencies).*

Notes for figure 6.2.1

1. When the cause of the trip is apparent or faulted section known includes:
   - an inadvertent trip by staff.
   - a fault on mains observed by field staff.
   - circulating currents caused by between zones switching. (no Earth Fault protection indication present).
   - protection indications (e.g. identifying a fault on one leg. of a double leg. 11kV CB)
   - SCADA indications (e.g. status, analogs, event logs)
   - line fault indicators

2. Extreme weather conditions include:
   - cyclone
   - flood
   - fire
   - earthquake
   - very severe storm with extensive damage. Typical indications include; many wires down within that substation area. The damage may be localised, or cover an extensive area.

3. Before attempting ~~an initial manual reclose during extreme weather, a risk as~~sessment shall be undertaken, inclu~~ding, but not limited to consideration of:~~
   - Congestion in ~~the wires down telephone queue.~~
   - Number of ac~~tive wires down in that substation area.~~
   - Damage rep~~orts with no Network Attachment Points relevant to that area.~~
   - Crew location~~s.~~
   - Damage in th~~e immediate vicinity of the feeder(s).~~
   - Current weat~~her conditions (e.g. if storm has travelled or is travelling throu~~gh the area.)
   - Time of day/vi~~sibility.~~

4. Refer Section 0 ~~and Section 6.4 for patrolling faulted feeders.~~

5. For a wholly und~~erground feeder, sectionalise prior to application of Manual R~~eclose policy.

6. Following failure ~~of an initial manual reclose, refer section 6.2.2 and figure 6.2~~.2.

6.2.1.4 Examples of Application of Manual Reclose Policy

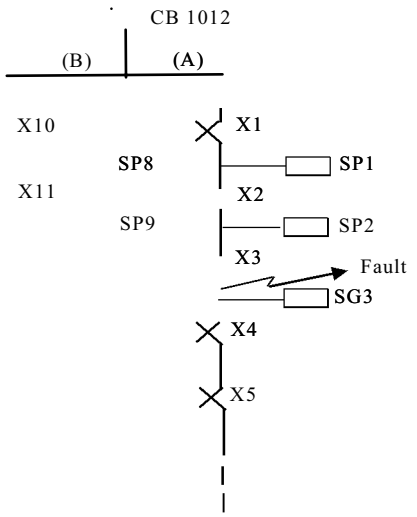
EXAMPLE 1

- No wires down
- Feeder locked out
- Faulted feeder (leg. A) apparent through SCADA indications, public or other
- Many LV ties involved

TYPICAL SWITCHING

(Double Cable Box 11kV CB)

1. Open X1 (Switch out faulted feeder - leg. A)
2. Close CB 1012 (restore supply to healthy feeder – leg. B)
3. Transfer healthy feeder (leg. B) to adjacent feeders
4. Sectionalise faulted feeder (leg. A) using CB 1012



6.2.2 Sectionalising and Progressive Restoration

6.2.2.1 Policy

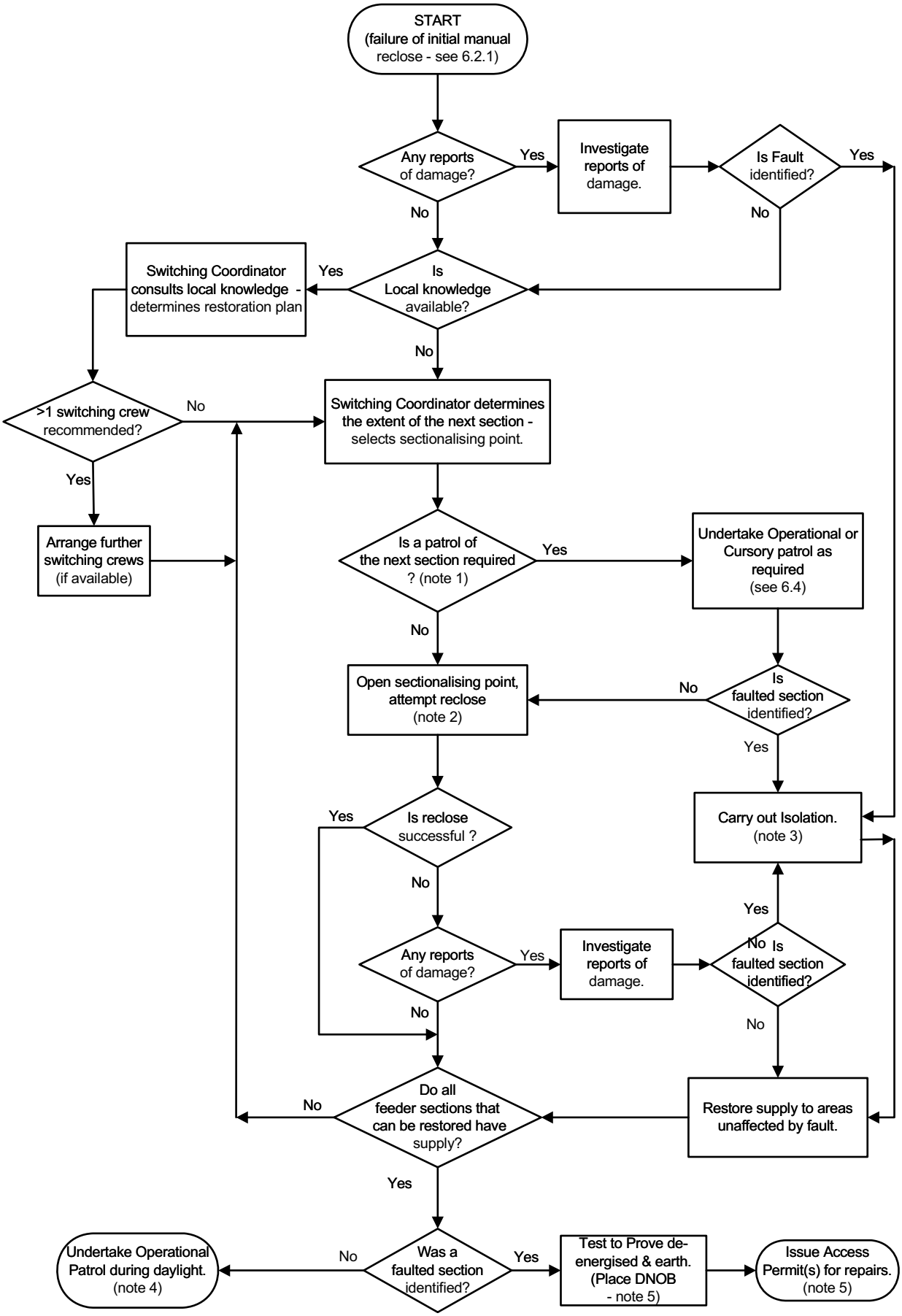
Following the failure of an initial manual reclose, in the absence of specific instructions, sectionalising is undertaken by dividing the original line section approximately in half. The process is repeated until the fault is found, or until the switching coordinator deems the section appropriate to apply a detailed patrol.

6.2.2.2 Procedure

The flowchart shown in Figure 6.2.2 should be followed for restoring supply to a HV feeder following failure of an initial manual reclose (Section 6.2.1). This process applies to lockouts of all protective devices including CB's, PMRs and MDOs. It defines the process for progressive restoration of supply by sectionalising. Faults are located through a process of eliminating non-faulted sections. Supply is restored to non-faulted sections as they are established.

Note: If a wire down is reported or found during the procedure, Section 6.1 - Wires Down procedure takes precedent.

Figure 6.2.2 Sectionalising and Progressive Restoration



Notes for figure 6.2.2

1. A cursory Patrol should be undertaken of all underground feeder sections, or if SEF protection has operated.

   With underground feeders, the purpose of this patrol is to quickly inspect underground cable terminations, and to identify sites where cable or equipment damage may have occurred.

   Where SEF protection has operated, the purpose of this patrol is to check for wires down & to identify safety hazards in areas frequented by the public.

2. For manual reclose of MDOs refer section 6.5.

3. Test to Prove de-energised (place DNOB) and the issue of an Access Permit does not have to be undertaken immediately following isolation. Repair should be commenced after supply is restored to all customers unaffected by the fault.

4. Record and reset all protection indications. If applicable, advise major customers supply is returned to normal.

5. If not already undertaken.

6.2.3 Local Knowledge

For feeders in which a special approach is required for the supply restoration process to be undertaken efficiently, the 'local knowledge' system can be used for reference. In some, typically rural situations, neglecting the geography and electrical layout of the feeder may result in the outage being unnecessarily protracted.

6.2.4 Checking for Three Healthy Phases - meshed supply systems

A check for three healthy phases shall be done when restoring supply to an overhead feeder that forms part of an interconnected supply system to identify the presence of a bridge off condition.

6.3 Area Troubles

6.3.1 Introduction

6.3.1.1 Objective

The objective of these procedures is to ensure the safety of all persons who are required to attend area troubles. Some of the hazards that are present when restoring supply to an area trouble are:

- expulsions from dropouts blowing
- surge diverter shattering explosively
- transformers rupturing with a fireball or boiling oil
- broken/burnt off dropper leads or faulty dropout bases/carriers

ENERGEX's Network Operating Philosophy is:

1. **SAFETY OF PEOPLE**
2. **PROTECT PLANT FROM DAMAGE**
3. **RESTORATION OF SUPPLY**

6.3.1.2 Scope

These procedures shall apply to all ENERGEX personnel and contractors.

6.3.1.3 Policy

Before re-energising plant, the switching operator must be satisfied that it is safe to do so. In particular, distribution transformers and surge diverters that are suspected to be faulty **shall not** be re-energised while the Switching Operator is in close proximity to them.

6.3.1.4 Symptoms and System Status

Transformer	Symptoms	Network Status
Single Phase	No Supply	HV Bridge(s) off to Transformer
		HV Fuse(s) Open
		LV Fuse Blown
		LV Bridge Off
	Dim Lights	Neutral Bridge Off or Faulty Fuse Base / Cartridge
Three Phase	No Supply	HV Bridge(s) off to Transformer
		Two or Three HV Fuses Open
		LV Fuse Blown
		LV Bridge Off
	Dim Lights	HV Bridge off to Transformer
		One HV Fuse Open
		Neutral Bridge Off or Faulty Fuse Base / Cartridge

Table 6.3.1 - Symptoms and System Status

6.3.1.5 Procedures

1. Determine the status of the network - e.g. bridge off, drop-out fuse blown
2. Determine the cause of the problem - e.g. tree in LV, wildlife on pole
3. Isolate, and if exclusion zones are to be encroached, test to prove de-energised and earth
4. Remove the cause of the problem
5. Restore supply if possible
6. Repair/replace faulty lines and apparatus if required
7. Restore network to normal status

6.3.2 Blown Dropout Fuse(s) to a Pole Transformer

In the case of area troubles involving blown drop-out fuses to a pole transformer, the flow chart in Figure 6.3.2 should be followed.

6.3.3 Blown Dropout Fuse(s) to a Ground Transformer

In the case of area troubles involving blown drop-out fuses to a ground transformer, the flow chart in Figure 6.3.3 should be followed.

6.3.4 Blown Switch Fuse(s) on a Ring Main Unit

In the case of area troubles involving blown drop-out fuses on a ring main unit, the flow chart in Figure 6.3.4 should be followed.

Figure 6.3.2 Procedure - Blown Dropout Fuse(s) on a Pole Transformer

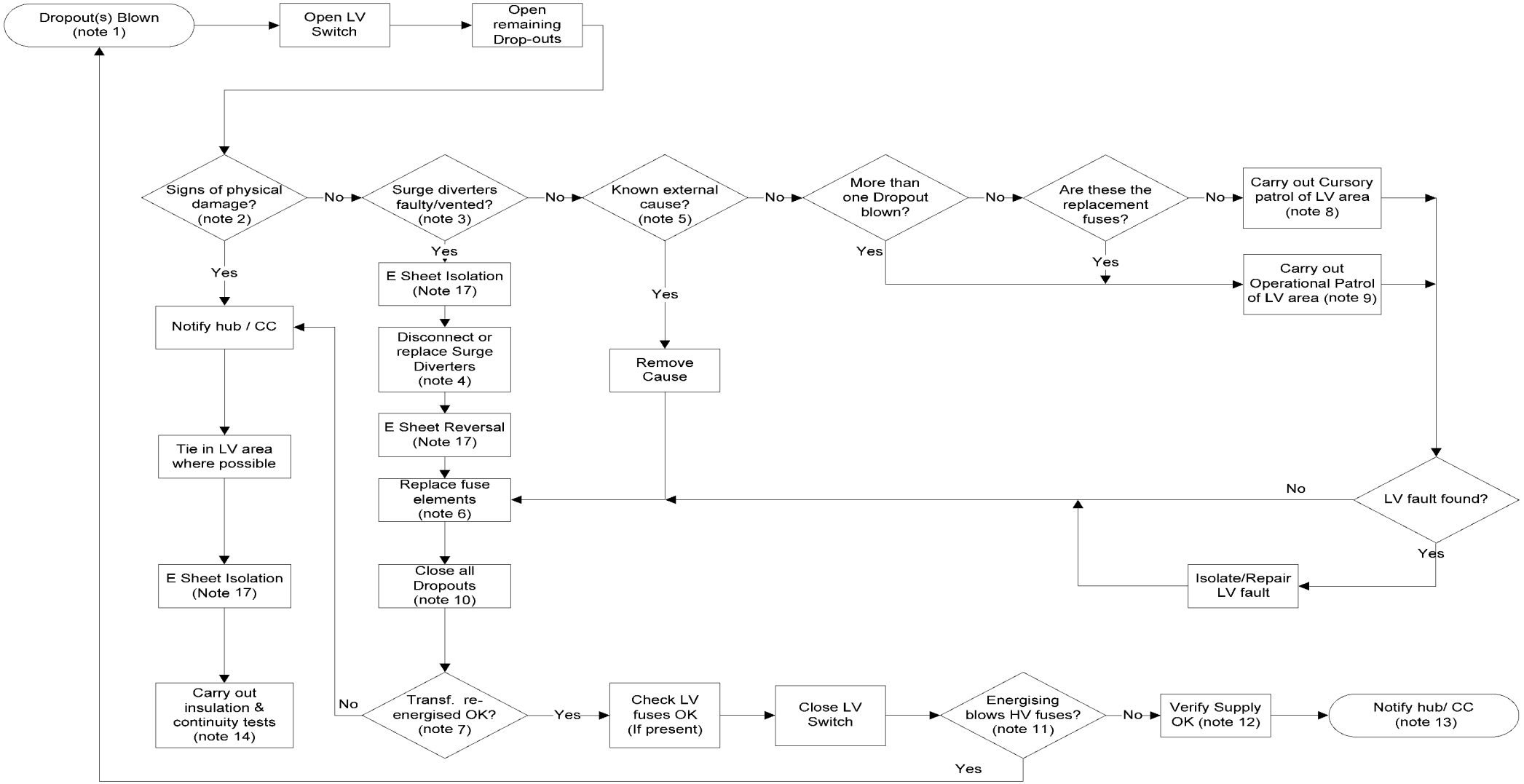


Figure 6.3.3 Procedure - Blown Dropout Fuse(s) on a Ground Transformer

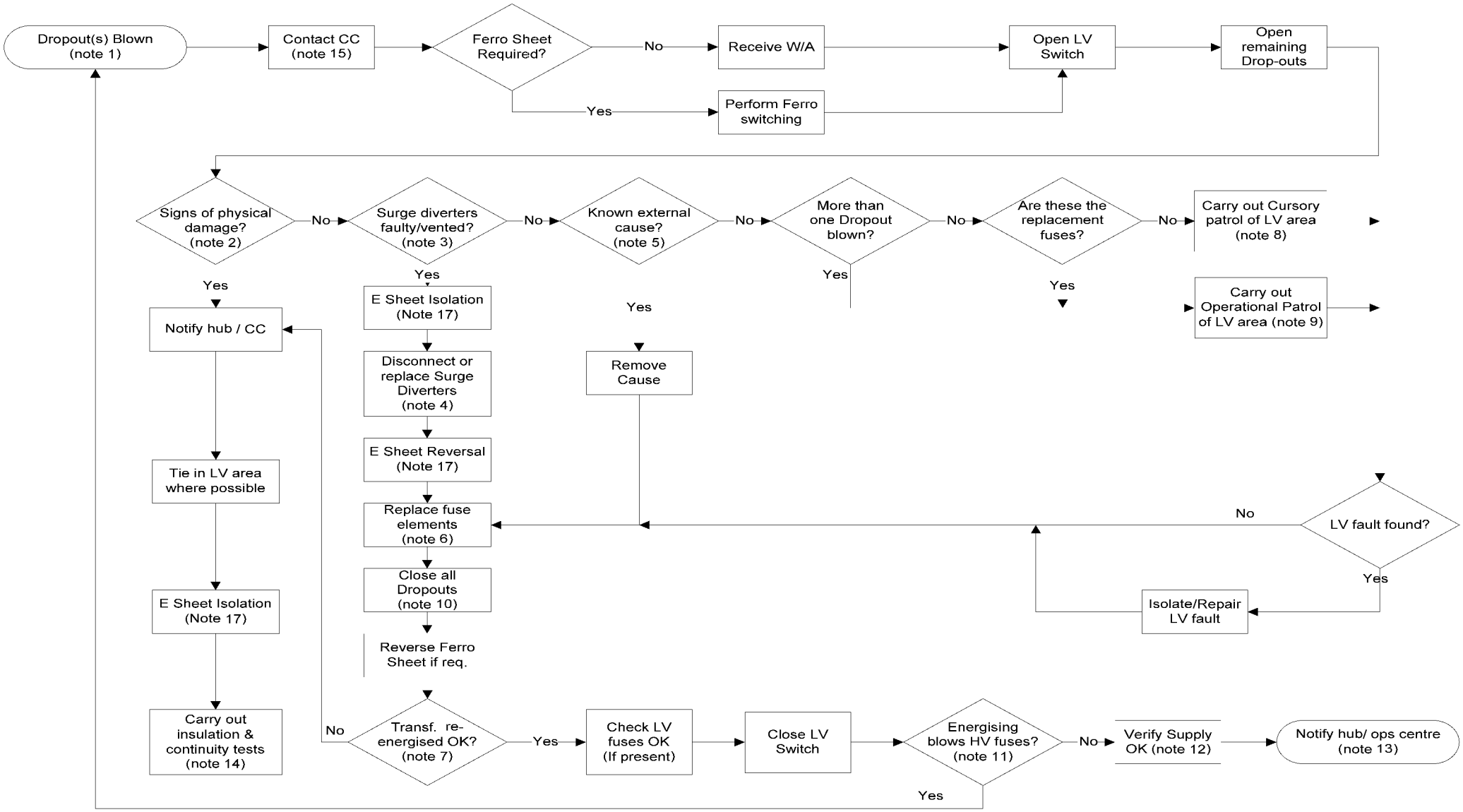
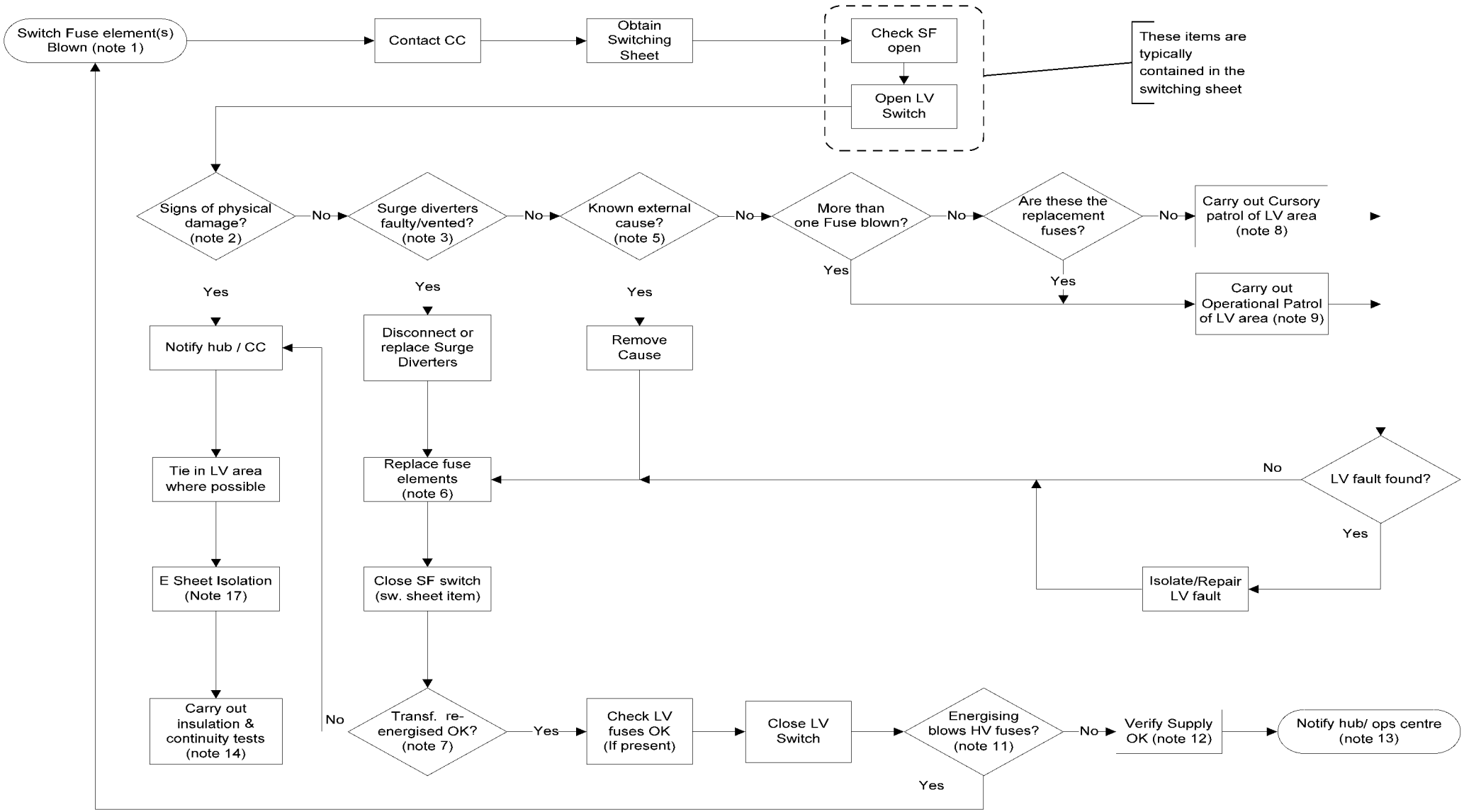


Figure 6.3.4 Procedure - Blown Fuse(s) on an RMU Switch Fuse Unit



Notes for figure 6.3.2 / 6.3.3 / 6.3.4

1. Blown Drop-out Fuses / Switch Fuses
   In some instances, High Voltage fuses can blow but the carrier may not drop or the Switch Fuse may not trip. In these circumstances a check of LV voltages will reveal an unbalance caused by the drop-out fuse / switch fuse being open-circuit. The blown phase(s) should be recorded.

2. Physical Signs of a Faulty Transformer include:
   - tank abnormally hot or deformed
   - evidence of recent oil spillage (especially black)
   - strange noises from the transformer

3. Checking for faulty Surge Diverters
   Applies to HV surge diverters that are mounted below the drop-out fuses, and to LV surge diverters that are attached to LV terminals. (Note: On feeders with limited fault current, visible damage may not be evident.)

   If HV exclusion zones are to be encroached for a close inspection for the disconnection or replacement of surge diverters, then SAHV Procedures shall be followed and an Access Permit obtained.

4. HV Surge Diverter Replacement
   - Vented - In general, it is sufficient to replace only the failed surge diverter.
   - Non-vented - All non-vented surge diverters in the set shall be replaced with vented types. Replace 10 kV in coastal areas with 12 kV surge diverters.

   (If a Live Line crew is to replace the surge diverter(s) at a later time, the surge diverters should be disconnected rather than cut clear for ease of replacement).

5. External Cause of Fault Known
   A high percentage of faults are caused by wildlife and vegetation. Inspection around the pole base (SP) as well as the terminals and mains of the transformer is advised. Information about the fault can often be obtained by looking up and down for the obvious (e.g. dead animals). Other possible causes of faults are from broken/burnt off dropper leads, faulty dropout bases and carriers, or when higher voltage mains come in contact with the 11 kV mains.

   If HV exclusion zones are encroached for removal of wildlife, vegetation or repairs then SAHV procedures shall be followed and an Access Permit obtained.

6. Fuse Replacement
   The drop-out fuse elements (or in the case of an RMU - switch fuses) on all phases should be replaced, as even those that did not blow could be deteriorated due to through fault current. All elements shall be checked to ensure they are correctly rated.

7. Transformer Re-energised
   After the transformer is re-energised, the switching operator should wait at least two minutes to confirm that the transformer is healthy.

8. Cursory Patrol
   The purpose of a cursory patrol is to conduct a quick inspection to identify unsafe situations, obvious faults and abnormalities such as wildlife, vegetation, plant failures, wires down …etc in the accessible area after a feeder lockout or operation.

9. Operational Patrol

The purpose of an operational patrol is to determine the location and nature of a fault. The patrols encompass areas identified as possibly being where the initiating event occurred. This can be based on protection indications, reports or based on local knowledge. Extensive efforts should be given to operational patrols to ensure that the fault cause is found.

10. Closing Drop-out Fuses
    Personal protection equipment shall be used when operating drop-out fuses as per ENERGEX's Safety Management System.

    Close all drop-outs by hooking the link stick behind the eye of the carrier. Line up the stick for the closing, ensure face shield is correctly fitted, and close smartly.

    The drop-out fuses should not be closed with the hook of the stick in the eye of the drop-out. Since the natural reaction when the drop-out fuses blow is to pull the stick away, therefore leaving the hook of the stick in the eye of the drop-out will mean opening the drop-out under fault, which may cause a flashover and a hazardous situation.

    If a transformer starts to make strange noises after the drop-outs are closed, do not attempt to re-open the drop-outs as you could be breaking fault current, which may cause a flashover.

11. Closing LV Switch
    If upon closing the LV switch, the drop-out fuse(s) / switch fuse(s) blow, then the cause is most likely to be a fault in the LV area.

12. Verify Supply OK
    Check all voltages and loads are within acceptable limits. When this is not possible, check surrounding premises to verify that all supply has been restored.

13. Notification
    When supply restored, the following information shall be recorded and should be reported to the Hub or Control Centre when convenient:
    - cause and location of fault
    - damage and action taken
    - further action required
    - load current (tong) and LV voltage readings
    - read and reset the MDIs (if fitted)
    - time supply restored

14. Insulation and Continuity Tests
    Figures outside the following ranges indicate that the transformer may be faulty. Instrumentation must be within calibration.

Distribution Transformer Rating in kVA	Winding Resistance (Ω)		Insulation Resistance (MΩ)	
	L.V. Ø-N	H.V. Ø-Ø	L.ṼØ-E @ 500 V	H.ṼØ-E @ 1000 V
10 – 1500	1 or less	200 or less	100 or greater	1000 or greater

Table 6.3.5 - Typical Insulation & Continuity Measurements

Insulation resistance is subject to wide variation due to design, temperature, humidity and cleanliness. Where insulation resistance falls below prescribed values, it can (where no defect exists) be brought up to the required standard by cleaning and drying the insulation.

The continuity measurement is performed to ensure that neither the HV nor LV circuit is open circuit. The circuit resistance is subject to wide variation due to rating, design, temperature and tap position (HV only). The following notes may be of assistance:

T-T (Tee Tee) Winding Configuration in 3 phase distribution transformers with ratings of 25/50/63 kVA may have the continuity measurements vary between each phase, due to their unique design.

DY (Delta Star) Winding Configuration continuity measurements on the LV winding are straight forward being either open circuit or as in the table above. Continuity measurements on the HV are normally the same between phases. An open circuit may also be characterised by one measurement being approximately twice that of the other two measurements.

15. E Sheet Isolation of a Ground Transformer (GT)
    The Switching Coordinator shall produce a switching sheet. It may be necessary – due to potential ferroresonance - to isolate the Ground Transformer using a 3 phase switch or switches upstream of the GT before the LV switch is opened. In this case the line should be proved de-energised before opening the LV switch.

    Rationale
    Energex has decided that the risk in operating single phase switches should be managed where there is a risk of ferroresonance causing injury to staff or plant. Field staff may be unaware of the specific conditions permitting ferroresonance. Network Operations maintains a record of sites where this could be an issue and have readily at hand the data to perform calculations confirming the presence or otherwise of a potential ferroresonant condition. On this basis it has been decided that approval from a Switching Coordinator shall be obtained before operating any EDOs associated with a GT. As the matter is a safety issue, a switching sheet provides an auditable record of authority being given to field staff to safely work on the apparatus. When there is no risk of ferroresonance, the switching sheet need only give authority to change the blown EDO.

16. E Sheet Isolation Ring Main Unit (RMU)
    The Switching Coordinator shall produce a switching sheet. Access to the switch fuses in an RMU requires the operation of a named HV switch (i.e. SFXXXX) and as such shall be recorded on a switching sheet. Depending on the construction of the RMU the sheet may include earthing the Switch Fuse.

17. If isolation is already complete via a switching sheet the fuse elements can be replaced as per next box in flow chart. If a switching sheet has been reversed and fuse elements are blown, before replacing the fuse elements the Switching Operator shall call control to complete isolation again via a switching sheet.

6.4 Patrolling Faulted Feeders

Policy
Following a fault on the power system, a patrol of the affected network is required to identify the root cause and any damage that may have been incurred to the network. These patrols are defined as either cursory or operational (refer section 0 - definitions), and entail a visual inspection of the network to locate primary (initiating) and secondary faults.

This procedure does not cover maintenance patrols that check the general condition and structural integrity of the network.

Background
Transient faults tend to result in operations of protective devices - with supply fully restored following reclose. Patrols undertaken at the next (daylight) opportunity following an operation of a protective device are important for determining the requirement for follow-up action, but are less critical in terms of their direct impact on customers supply.

Sustained faults (e.g. a "locked out" feeder protective device) require some degree of manual intervention to isolate the fault and enable supply to be restored. For this reason feeder patrolling procedures applied to a 'locked out' feeder protective device have a great impact on supply availability, and need to be executed promptly and effectively.

If the feeder protective device is 'locked-out', the Switching Coordinator should investigate reports of damage, and/or patrol in conjunction with a plan for restoration. The Switching Coordinator shall indicate where and when the patrol is to commence, and at what point during the patrol next contact should be made with him. Regular contact between the Patrol Officer and the Switching Coordinator is essential in efficient patrolling.

Note: The most important rule of patrolling feeders following fault is that the patrol is to be undertaken strictly in accordance with the Switching Coordinators instructions.

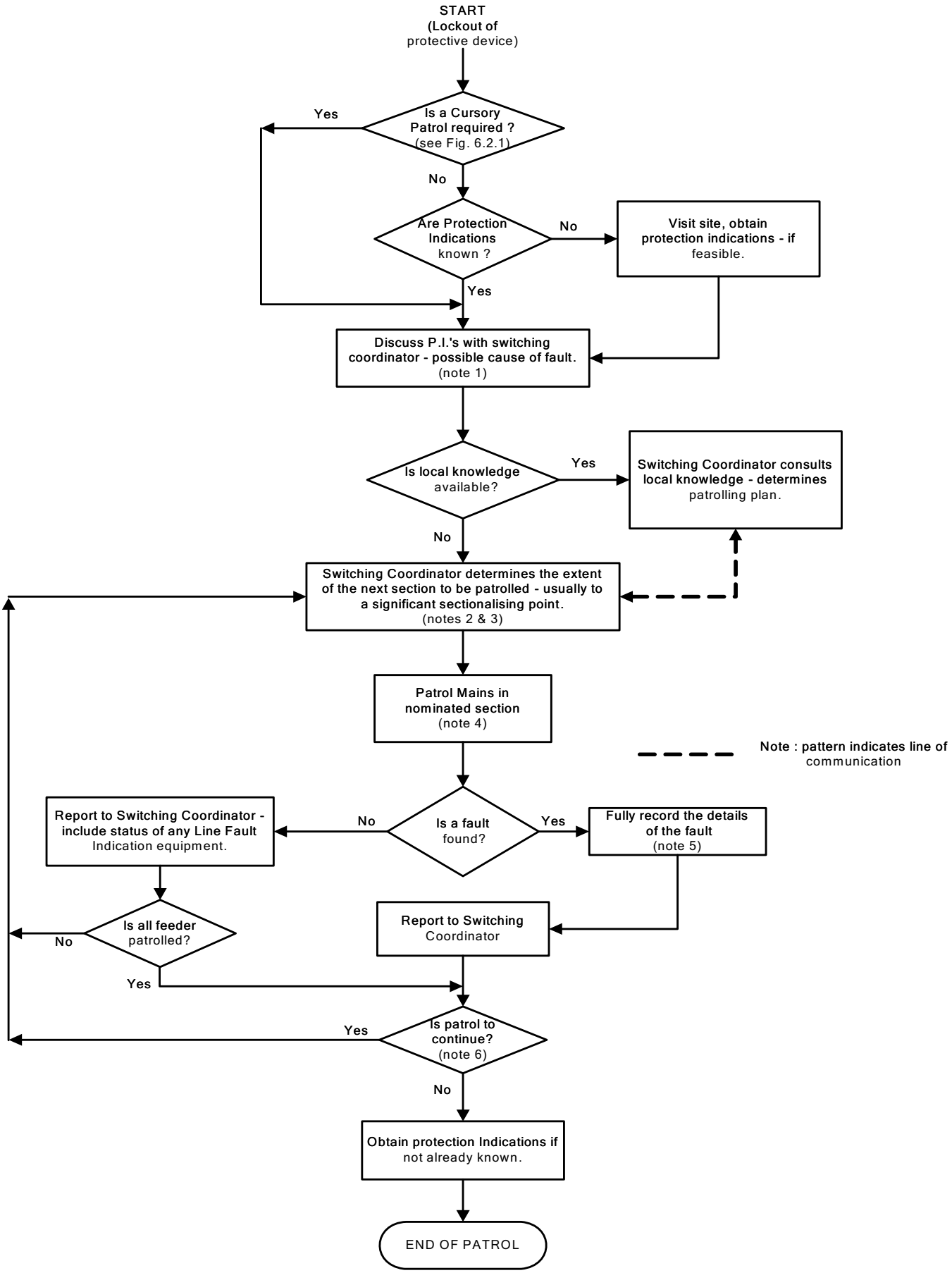
6.4.1 Patrol Procedures Following the Lockout of a Protective Device

The flowchart shown in Figure 6.4.1 should be followed when undertaking patrols following the lockout of a protective device.

6.4.2 Patrol Procedures Following the Operation of a Protective Device

The flowchart shown in Figure 6.4.2 should be followed when undertaking patrols following the operation of a protective device.

Figure 6.4.1 Feeder Lockout Patrol Procedure



Notes for Figure 6.4.1

1. For a summary of protection indications and associated fault causes refer Section 6.6.

2. The Switching Coordinator outlines the full extent of the required patrol, including tee-offs, etc. Ideally the description should be geographically rather than schematically based.

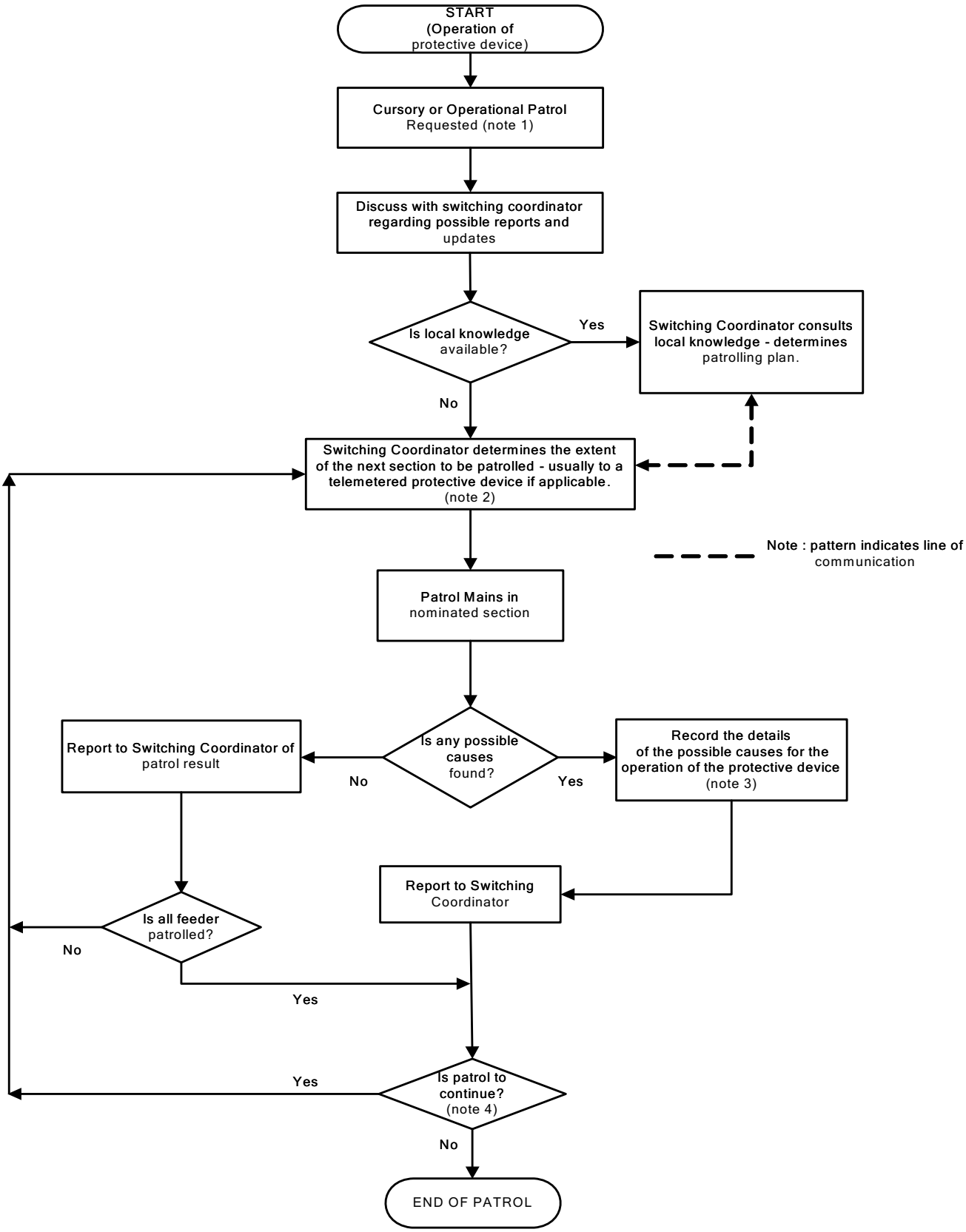
3. The Switching Coordinator may opt at this point to open a sectionalising point and re-energise supply in the patrolled section.

4. Cursory or operational patrol as appropriate.

5. The patrol officer shall record:
   - the location of the fault
   - the nearest isolation points
   - a concise damage report
   - an assessment of likely repair time

6. The Switching Coordinator will decide if more patrolling is further required on the feeder.

Figure 6.4.2 Feeder Operation Patrol Procedure



Notes for Figure 6.4.2

1. The Switching Coordinator will decide on the type of patrol required depending on the number of recurrent operations on the protective device.

2. The Switching Coordinator outlines the full extent of the required patrol, including tee-offs, etc. Ideally the description should be geographically rather than schematically based.

3. The patrol crew shall record:
   - the location where the transient fault initially occurred
   - the possible cause leading to the transient fault e.g trees on mains, lighting…etc
   - the extent of the damage (if any)

4. The Switching Coordinator will decide if more patrolling is further required on the feeder.

6.4.3 General

Patrols can be undertaken by one or more patrol officers in either the same or separate vehicles subject to environmental conditions, geography, access and traffic. They will typically be undertaken by two persons operating from the one vehicle. This both maintains road safety and allows the passenger to completely focus on examining the overhead mains and looking for the cause of the fault. This is particularly important after dark when the person inspecting the mains will be required to hold a spotlight. The minimum requirements for a patrol officer are knowledge of overhead and/or underground distribution network construction.

Timeliness of patrol officer's response is essential. If customers are without supply, a degree of urgency should be applied in the execution of the patrol. Regular contact with the Switching Coordinator maintains the currency of the patrolling instructions.

One important issue that the Switching Coordinator shall consider is that of primary (initiating) and secondary faults. In the case that the initiating fault was between phases, and high fault currents are involved, the through current can disturb the source network and create secondary faults. For example, the forces generated between conductors of the affected phases on the supply side of the fault can cause sufficient movement causing the conductors to make contact - this is the "clashing conductors" phenomena. Another example is a conductor joint failing due to the extra heat produced by the through current, resulting in the main falling down. The Switching Coordinator should not jump to conclusions, and maintain awareness of whether the identified fault is a primary or secondary fault.

6.4.4 Operational Patrols

The purpose of an operational patrol is to determine the location and nature of a fault. The patrols encompass areas identified as possibly being where the initiating event occurred. This can be based on protection indications, reports or based on local knowledge. Extensive efforts should be given to operational patrols to ensure that the fault cause is found.

From the protection indications and the circumstances, the nature of the fault can be inferred, and provide insight to the type of fault expected. For example, an SEF trip may be indicative of a high impedance ground fault, typically caused by conductors down on the road, or trees in the mains.

6.4.5 Cursory Patrols

The purpose of a cursory patrol is to conduct a quick inspection to identify unsafe situations, obvious faults and abnormalities such as wildlife, vegetation, plant failures, wires down…etc in the accessible areas after a feeder lockout or operation.

6.4.6 Patrolling 11 kV Feeders following Lockouts

Undertaking operational patrols of 11 kV overhead feeders requires considerable concentration from both the Patrol Officer and the Switching Coordinator due to the extent and complexity of the network. Apart from looking for the actual fault, the patrol officer must closely follow the connectivity of the feeder. A lack of concentration can lead to the wrong circuit being patrolled, or tee offs from the main circuit being overlooked. As 11 kV lockouts generally involve loss of supply to customers, the patrol officers must focus on promptly completing the current task assigned by the Switching Coordinator, and not be distracted by spurious 'reports' provided by residents.

6.4.7 Patrolling 33 kV Feeders following Lockouts

As 33 kV feeders are relatively simple in terms of their connectivity (usually being point to point without intermediate isolation points), the associated patrol process is simplified. 33 kV feeders often form part of a meshed network, and as a consequence have protection that requires more skill to interpret.

In the absence of specific reports, the patrol should commence from one substation and continue to the next substation or until the fault is located. As loss of one 33 kV feeder does not usually involve loss of supply, the urgency that is a requirement with lockouts of 11 kV protective devices is not present.

6.4.8 Urban and Rural feeders

Feeder Type	Route Length	Access	(SPECIAL) Considerations
11 kV Urban	< 10 km	Primarily street access	Proximity of other circuits and distribution equipment, LV ties, surge arresters, many UG cable terminations
33 kV Urban			OHEW Proximity of other circuits
11 kV Rural	> 10 km	Considerable percentage of feeder through private property.	LFI's, Reclosers, Sectionalisers, Regulators, MDO's
33 kV Rural			OHEW, LFI's, Reclosers

Table 6.4.8 - General Attributes of Urban and Rural Feeders

Rural feeders are typically radial, overhead and less complex electrically, but are considerably longer and often have more constraints associated with access when compared to urban feeders. They often have downstream protection devices or fault indication equipment positioned at critical locations along the feeder route. The status of this equipment should be considered when undertaking feeder patrol/restoration. Any relevant local knowledge should be employed.

Cursory patrols of feeder sections are typically less frequent and not as extensive in rural areas, when compared to urban areas. Fault initiation is typically related to storms, wildlife and trees and is often obvious.

Urban feeders can be part of a radial or meshed network, overhead and underground and typically more complex electrically. They are much shorter in length, and protection systems may be more complex. Access is typically easier.
Cursory patrols of feeder sections are typically required. Fault initiation is more diverse, and can be harder to identify.

6.4.9 Patrol Following Operation of Protective Device

These guidelines shall be followed when undertaking operational patrols following the successful automatic reclose of a feeder protective device.

The purpose of these patrols is to identify the possible initiating event for the operation, and any damage that may have resulted. These patrols are important as they present the opportunity to correct potential faults before they impact on connected customers. The following guidelines optimise the value of patrols for the majority of situations. Some judgement will still apply for situations not covered by the guidelines.

110/132 kV Feeders
In all circumstances, an operational patrol is required immediately or in the next daylight hours.

33 kV Feeders
If a storm and/or high wind (>30 knots) is present, no patrol is required. In cases where the operation of the 33 kV protective device will not result in a loss of supply, an operational patrol is required within three working days. If the operation of the 33 kV protective device will result in a loss of supply then an operational patrol is required immediately.

11 kV Feeders
If a storm and/or high wind (>30 knots) is present, no patrol is required. In all other cases, refer to table 6.4.9.1 and table 6.4.9.2 to determine the type of patrol required.

Notes:

1. *If a report is received from the public (e.g. explosion), then a check is required immediately on the feeder in the vicinity of the report. If nothing is found, follow the above criteria to determine if a full Operational Patrol is required.*

2. *Immediate patrols can be requested under the direction of the Switching Coordinator*

3. *In normal business hours, the Switching Coordinator should consult with the Asset Reliability Officers to obtain local knowledge that may assist in the patrol.*

4. *All protection flags should be reset at the time of the patrol.*

	Urban Feeder			Urban Feeder		
	Daylight			Night time		
Number of Customers	1st Operation	2nd operation	3 or more operations	1st Operation	2nd Operation	3 or more operations
<500	1 crew cursory patrol non-urgent	1 crew operational patrol immediately	2 crew operational patrol immediately. Apply A/R block at discretion	1 crew cursory patrol Non-urgent at first light	1 crew cursory patrol immediately + 1 crew operational patrol daytime (if no fault found)	2 crew cursory patrol immediately + 1 crew operational patrol Daytime (if no fault found) Apply A/R block at discretion
≥ 500 < 2000	1 crew operational patrol non-urgent	1 crew operational patrol immediately	2 crew operational patrol immediately. Apply A/R block at discretion	1 crew operational patrol non-urgent at first light	1 crew cursory patrol Immediately + 1 crew operational patrol daytime (if no fault found)	2 crew cursory patrol immediately + 1 crew operational patrol Daytime (if no fault found) Apply A/R block at discretion
≥ 2000	1 crew operational patrol non-urgent	2 crew operational patrol immediately	2 crew Operational patrol immediately. Apply A/R block at discretion	1 crew operational patrol non-urgent at first light	1 crew cursory patrol Immediately + 1 crew operational patrol daytime (if no fault found)	2 crew cursory patrol immediately + 1 crew operational patrol Daytime (if no fault found) Apply A/R block at discretion

Table 6.4.9.1 – 11kV Urban Feeder Patrol Following Operation of Protective Devices

Non-Urgent means whenever resources are available

	Rural Feeder			Rural Feeder		
	Daylight			Night time		
Number of Customers	1st Operation	2nd operation	3 or more operations	1st Operation	2nd Operation	3 or more operations
<500	1 crew cursory patrol non-urgent	1 crew cursory patrol non-urgent	1 crew operational patrol immediately	1 crew cursory patrol Non-urgent at first light	1 crew cursory patrol Non-urgent at first light	1 crew cursory patrol immediately + 1 crew operational patrol Daytime (if no fault found) Apply A/R block at discretion
≥ 500 < 2000	1 crew cursory patrol non-urgent	1 crew operational patrol immediately	2 crew operational patrol immediately Apply A/R block at discretion	1 crew cursory patrol Non-urgent at first light	1 crew cursory patrol Non-urgent at first light	1 crew cursory patrol immediately + 1 crew operational patrol Daytime (if no fault found) Apply A/R block at discretion
≥ 2000	1 crew operational patrol non-urgent	2 crew operational patrol immediately	2 crew Operational patrol immediately Apply A/R block at discretion	1 crew cursory patrol Non-urgent at first light	1 crew cursory patrol Immediately + 1 crew operational patrol daytime (if no fault found)	1 crew cursory patrol immediately + 1 crew operational patrol Daytime (if no fault found) Apply A/R block at discretion

Table 6.4.9.2 – 11kV Rural Feeder Patrol Following Operation of Protective Devices

Non-Urgent means whenever resources are available

6.5 Master Drop-Out Fuses (MDO's)

6.5.1 Background

Master Drop-out Fuses (MDO's) are high voltage expulsion drop-out fuses used as line protective devices to protect a line and its associated equipment. MDO's are typically located at the start of a spur or tee-off from the feeder backbone, and operate to isolate faults in the spur or tee-off.

Ganged MDO's are master drop-out fuses which are mechanically configured to open all three phases on fault, irrespective of fault type. The faulted phase(s) utilise the fuse element to interrupt the supply, the healthy phase(s) load is broken by the mechanical action of the fuse carrier opening under gravity. Ganged MDO's are typically used in ferroresonant distribution transformer applications for transformers rated up to 315 kVA.

6.5.2 Policy

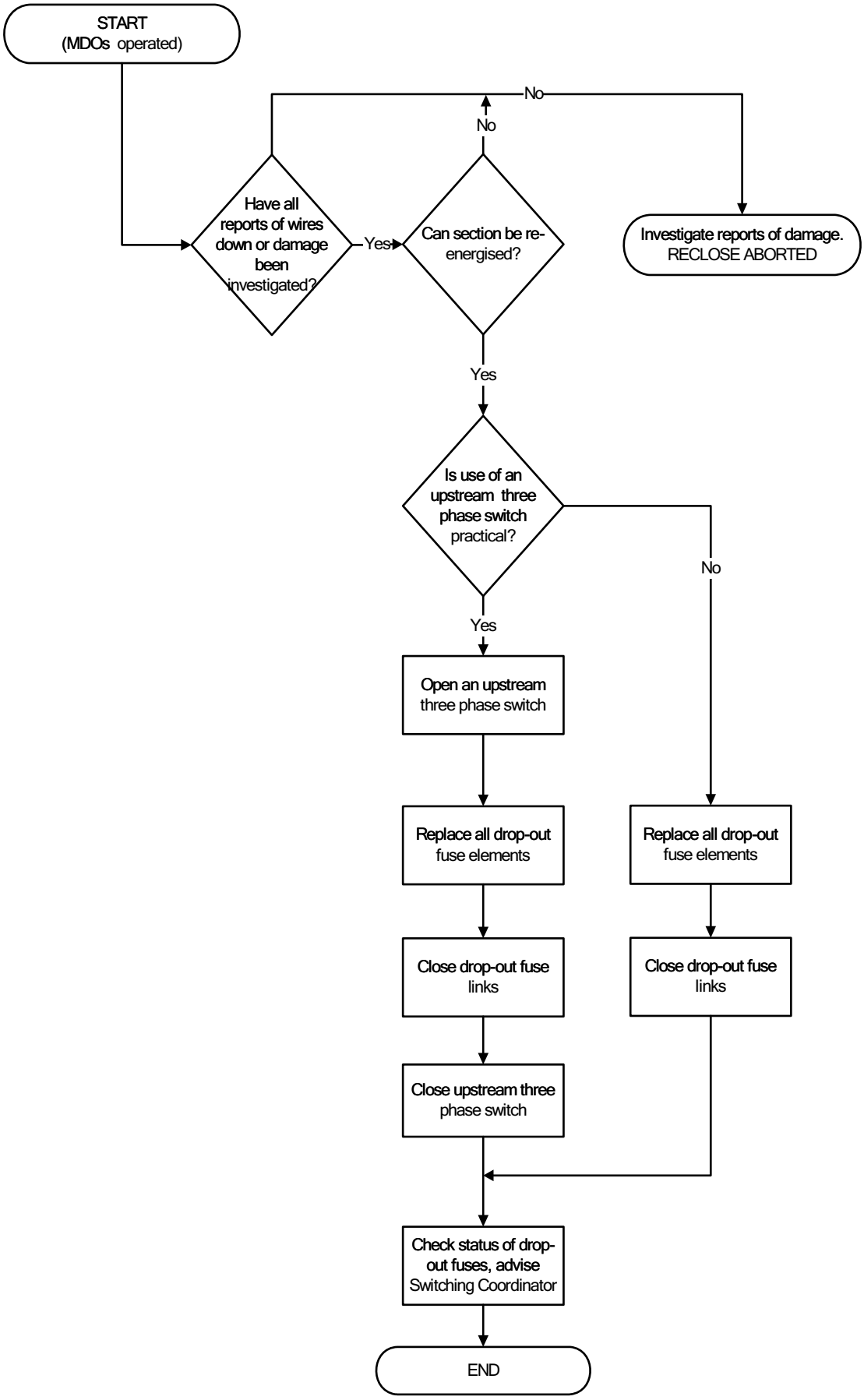
The operation of any MDO assembly shall be treated as per the lockout of any protective device (e.g. CB, PMR, etc). Management of supply restoration is to be undertaken in accordance with SAHV procedures and as detailed in Section 6.

6.5.3 Procedure

Following a report of Master Drop-out fuses blown, the flowchart shown in Figure 6.5.1 shall be followed for attempting manual reclose of the MDO fuses.

All MDO fuse elements should be replaced on operation of any of the elements.

Figure 6.5.1 Manual Reclose Procedure for MDOs



6.6 Faults and Protection Indications

Central to the efficient restoration of supply is fault identification. Often faults will not be as obvious as wires down, and may be difficult to locate. To assist in locating the fault, it is important to understand what type of protection has operated and what causes this type of protection to operate. This is linked with protection indications. The following section details what to expect based on the protection indications.

6.6.1 Basic Fault Types

Table 6.6.1 provides details of fault types and the associated protection operations expected.

Fault Type	Comment	Typical Protection
Single line to ground	Commonly caused by wildlife. This is the most common type of fault on the distribution system. Involves a passage of current from one phase to earth.	E/F, SEF, O/C and E/F, FD
Double line to ground	Needs two phases to contact earth almost simultaneously, occurs infrequently.	E/F, 1 or 2 O/C and E/F, FD
Three phase to ground	Commonly caused by lightning. In the case that the fault is balanced no ground current flows.	2 or 3 O/C and EF, FD
Phase to Phase	Commonly caused by trees. The most common fault type after single line to ground.	1 or 2 O/C, FD
Three Phase	Commonly caused by fires, trees.	2 or 3 O/C, FD

Table 6.6.1 - Basic Fault Types

6.6.2 Inferring Fault Causes from Protection Indications

Table 6.6.2 provides a guide for fault identification given protection indications. This should be used to assist in locating the fault.

Protection Indication	Typical Fault Cause
Earth Fault or Overcurrent & Earth Fault	Failed lightning arrester
	Underground cable fault
	Wires down - good earth connection
	Wildlife bridging out insulators
	Machinery contacting mains
	Trees in mains
	Flicker blade closed between feeders (11 kV)
	Bridge off in parallel feed (33 kV)
Sensitive Earth Fault	Wires down - high impedance (e.g. on road)
	Wires down – away from supply side
	Faulty Pole Transformer
	Flicker blade closed between feeders (11 kV)
	Failed Lightning Arrester
Earth Fault or Sensitive Earth Fault	Wires on stays
	Trees in mains
	pole fires
	damaged insulator strings
One or Two Overcurrents	Broken crossarm
	Wildlife bridging out insulation - e.g. on potheads, birds flying into mains
	Clashing conductors
	Trees in mains
Two Overcurrents	Lightning strike – direct
	Lightning strike – nearby ground strike causing back flashover.
	Closing in on earths
Feeder Differential	No inference can be made, other than the fault was within the zone covered by feeder diff CT's.

Table 6.6.2 - Typical Fault Causes and Protection Indications

7 Work Involving Secondary Systems

7.1 Introduction

7.1.1 Purpose

The purpose of the following procedures is to ensure that:

- advance notice is given when work involving secondary systems is to be undertaken, so that appropriate actions regarding operation of the HV network are taken
- work involving secondary systems is undertaken in a coordinated manner
- inadvertent tripping is avoided
- HV electrical apparatus is always adequately protected
- network security is not compromised

7.1.2 Scope

The following procedures apply to work involving secondary systems that:

- can cause the tripping of energised HV electrical apparatus; or
- can inhibit the tripping of energised HV electrical apparatus; or
- removes from service, communications or control systems that are required for the operation of the HV supply network

7.2 Responsibilities

Refer to Section 0 of this Manual for the responsibilities of the secondary systems applicant, secondary systems checker, Outage Coordinator and Switching Coordinator regarding work involving secondary systems.

7.3 Secondary Systems

"Secondary Systems" is a general term used to describe all protection, control and communication bearer systems.

7.3.1 Typical examples of Trip Circuits

- Protection Circuits (including communications connections to protection relays)
- Local Trip Circuits
- Intertrip Circuits
- Remote Control or Supervisory Circuits
- Under Frequency Circuits
- Voice Frequency Protection Signalling
- Equipment which could activate Protection Circuits, eg Buchholz, WTI's, OTI's, CBF (Circuit Breaker Fail), Cable Pressure (low/high), V/T's, B/Z, Bus Blocking Schemes etc

7.3.2 Typical examples of Control Systems

- Micro-Controllers (Micro-SACS)
- PC Mini-SACS & PC SACS Units
- RDC Units

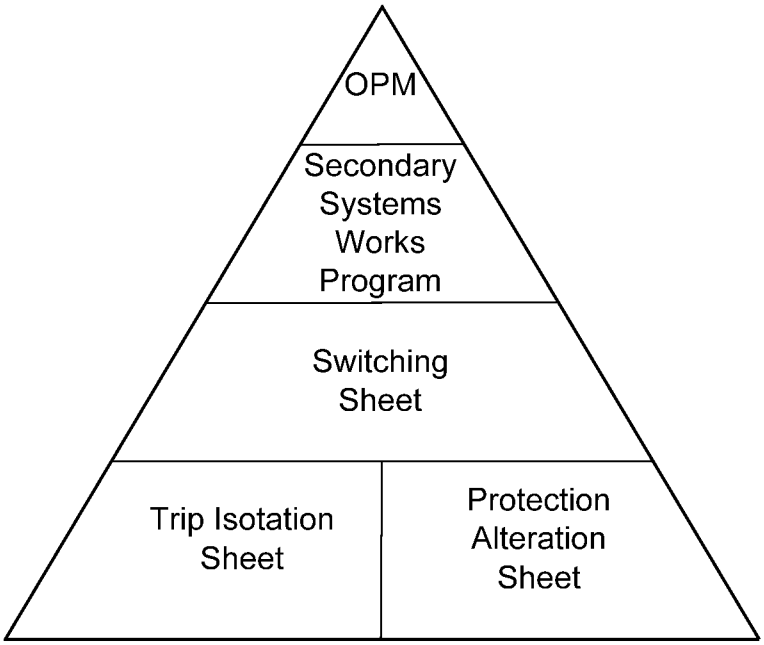
7.3.3 Typical examples of Communication Bearers

- Pilot Cables
- Telephone Lines
- Microwave Bearers
- Optical Fibre Cables

7.4 Secondary Systems Hierarchy

This chart displays the order of hierarchy for secondary systems documentation.

Secondary Systems Hierarchy Chart



7.5 Secondary Systems Works Programmes (SSWP's)

The secondary systems works programme is used to coordinate all activities including those detailed on switching sheets. Its benefits lie in ensuring that all activities are completed in the correct sequence. It may refer to trip isolation sheets, protection alteration sheets, switching sheets and may include items to re-route protection and data circuits.

A secondary system works programme consists of a SSWP summary sheet (Form 495) and a SSWP programme sheet (Form 1770) and associated TIS's/PAS's. The summary and programme sheets shall have the same unique identifying number.

Secondary system works programmes are required in the following situations:

- when secondary systems activities are required to be performed by multiple workgroups at different sites
- when multiple secondary systems activities are required to be performed in a specific order
- when several TIS's/PAS's are required
- circuits on communication bearers are involved
- control systems upgrades and software changes
- when changing the state of protection or communications to pole mounted plant (i.e. reclosers, sectionalisers etc)
- any work of sufficient complexity to warrant a written record to be kept

The Outage Coordinator may decide an SSWP is not necessary, provided there is only one work group and the TIS(s)/PAS(s), if any, are recorded on a switching sheet in the correct sequence.

7.6 Trip Isolation Sheets (TIS's)

A trip isolation sheet (Form 510) is a means of clearly describing each link or isolation point involved in isolating a trip circuit at a particular location. A single trip isolation sheet may be used for a protection scheme, provided the whole scheme is isolated and then subsequently returned to service under that sheet. For other jobs which require trip isolation at more than one location (eg. at more than one substation) or separate protection schemes (eg. dual primary protection), then a separate trip isolation sheet shall be required for each location or protection scheme.

Each trip isolation sheet shall have a unique number.

Except where covered by an approved work practice/instruction (Refer 7.8), trip isolation sheets shall be used or all work involving trip circuits that may cause or inhibit tripping of energised HV electrical apparatus.

7.7 Protection Alteration Sheets (PAS's)

A protection alteration sheet (Form 0505) is a means of clearly describing alterations to protection circuits such as the removal or bypassing of equipment in CT or VT circuits, or the alteration of tripping circuits at a particular location.

Except where covered by an approved work practice/instruction (Refer 7.8), protection alteration sheets shall be used for all alterations to protection circuits including CT and VT circuits[1].

Each protection alteration sheet shall have a unique number.

7.8 Approved Work Practice/Instruction

Approved work practice/instruction developed in consultation with major stakeholders and based on technical risk assessment shall be used to determine if trip isolation or protection alterations are required. Approved work practice/instruction shall indicate the appropriate methods of isolation or alteration.

7.9 Procedures for Planned and Emergency Work

7.9.1 Work Planning

The secondary systems applicant shall contact the Outage Coordinator responsible for that part of the network (ie the highest voltage level affected) and advise what protection, data, control or communications systems will be affected and the duration of the outage.

The Outage Coordinator shall then determine:
(a) if the job can proceed on the date requested
(b) if other parties need to be notified (eg. Outage Coordinators responsible for the lower voltage networks)
(c) if a trip isolation sheet is required (Refer section 7.6)
(d) if a protection alteration sheet is required (Refer section 7.7)
(e) if a secondary systems works programme is required (Refer section 7.5)
(f) if secondary circuits should be re-routed
(g) if automatic Zellweger and capacitors programs are affected
(h) what measures need to be taken to ensure that electrical apparatus remains adequately protected, and network security is maintained, for example:
- if the affected part of the HV Network is to be de-energised for the work duration

[1] PASs are used for alterations, TISs are used for isolations.

- if the HV Network is to be re-configured for the duration of the job (eg. rings are broken to utilise back-up protection)
- if a protection permit is required

(i) identify any possible changes to control systems parameters, contingency plans, operating standards etc, and trigger appropriate action as required

If the work may proceed, the Outage Coordinator shall advise the secondary systems applicant and, then ensure that the job is entered in that days switching schedule.

For emergency work follow normal work procedures.

7.9.2 Preparing, Checking and Authorising Documentation (TIS/PAS/SSWP)

The secondary systems applicant shall be responsible for arranging the preparation (which should be compared to actual on-site conditions) and checking of each document. Where the secondary systems applicant does not have the expertise, then the document(s) shall be referred to the relevant services group for action. The secondary systems applicant shall then forward the document(s) to the Outage Coordinator responsible for that part of the network for authorisation. The Outage Coordinator shall authorise (preferably by signing) the document(s) and then return them to the secondary Systems applicant.

The correctness of the documents (other than "Effect on Security" issues, see 7.9.1) rests with the person who signs the sheet as checked. TIS's, SSWP's, and PAS's shall only be signed as checked by persons with secondary systems checker (SSC) authorisation.
Note: The checker shall not be the same person who prepared the document.

The responsibility for authorising the document(s) (including the "Effect on Security" issues, see 7.9.1) rests with the Outage Coordinator. (Note: The authoriser verifies the preparer and checker is not the same person and confirms the work can proceed on the nominated time and date).

7.9.3 Coordination

A copy of all TIS's, SSWP's, and PAS's required shall be provided to the Switching Coordinator prior to the commencement of the work.

The Switching Coordinator shall coordinate the TIS's, SSWP's, and PAS's during the progress of work, and ensure any changes to control system parameters are checked at the completion of the job.

7.10 Non-commissioned-Protection-Schemes

Approved work practice/instructions[2] must be used to ensure that non-commissioned-protection-schemes are kept isolated from commissioned protection schemes during installation and pre-commissioning checks.

A non-commissioned-protection-scheme must be effectively isolated from commissioned schemes at all times, (e.g. links removed or wires removed and taped up), except for (where applicable);

- The period of time required by commissioning staff to prove the correct interaction between the non-commissioned and commissioned schemes. (Note: during this period the affected commissioned scheme shall be effectively isolated)

Example: Testing inter-connecting circuitry between CBF (non-commissioned) and BZ Multi-trip (commissioned) scheme.

[2] For example, a work instruction might include the use of a permanent plastic cover bearing the words "Non commissioned" to identify all links related to non-commissioned or decommissioned protection schemes.

Dedicated pre-commissioning check sheets shall be used to commission/re-commission any new or previously decommissioned protection schemes.

7.10.1 Projects Involving New Secondary Systems Work and Commissioned Plant

Requirements for new Secondary Systems work for commissioned plant shall be negotiated between the Outage Coordinator and the Commissioning Coordinator/Applicant

A typical application for this section can be found in Section 11 8.2 - Commissioning Procedures Involving HV Electrical Apparatus with Spare Switches

The Work Activity and Work Clearance Method table listed below shall be utilized for new work on Commissioned Secondary Systems.

Work Activity	**Work Clearance Method**
Wiring Modifications (Not cutting into existing secondary systems)	Advise Control Room that Substations Fitter is on site
Integrity and testing work at one work site, including functional testing and the application of RSRs to protection schemes.	Commissioning Coordinator/ Applicant to apply for switching sheet through the current BMS process. Work conditions may require an Access or Test Permit and/or a SSWP
Wiring Modifications (cutting into existing secondary systems)	Commissioning Coordinator/ Applicant to apply for switching sheet through the current BMS process. Work conditions will require a Work Authority and/or a SSWP.
Ductoring / Meggering	Commissioning Coordinator/ Applicant to apply for switching sheet through the current BMS process An Access / Test Permit or SSWP shall be required; however a Work Authority can be issued for a withdraw-able circuit breaker.
Energise the new electrical apparatus	A switching sheet shall be used, and an AE obtained from Commissioning Coordinator giving clearance to energise new electrical apparatus.

Table 7.1

11 Commissioning and Decommissioning Procedures

11.1 Introduction

The following requirements apply to all work involving **Not Electrically Connected** electrical apparatus. This will include all of ENERGEX assets including intended assets.

In this section **Not Electrically Connected** electrical apparatus will also be referred as Non Commissioned and/or Decommissioned electrical apparatus.

ENERGEX's Network Operating Philosophy applies to HV Commissioning / Decommissioning procedures:

1. Safety of People
2. Protect Plant from Damage
3. Restoration of Supply - Safe to Energise New Plant

11.1.1 Purpose

The purpose of the following procedures is to ensure that:

- a safe working environment is achieved when working on Not Electrically Connected electrical apparatus
- Commissioning of electrical apparatus is conducted in a coordinated manner that does not adversely effect network security and/or customer's reliability or quality of supply
- Decommissioning of existing electrical apparatus to make it Not Electrically Connected is conducted in a coordinated manner that does not adversely effect network security and/or customer's reliability or quality of supply
- Not Electrically Connected electrical apparatus is in a acceptable condition before Commissioning / Decommissioning
- all persons are clear before electrical apparatus is energised
- Not Electrically Connected electrical apparatus is disconnected from all energy sources by an approved method
- Switching Coordinators are aware of the state of the HV network during the Commissioning / Decommissioning Process
- records relating to new or altered electrical apparatus are available before commissioning or decommissioning

11.1.2 Scope

These procedures are to be used by the Commissioning Coordinator to provide:

- Authority to work on HV Not Electrically Connected electrical apparatus which in some cases extends to low voltage disconnection points
- Authority to work on HV Not Electrically Connected electrical apparatus involving secondary systems
- Authority to carry out work which is not classified as "Repair & Maintenance" work, refer to Section 10.2

11.1.3 Responsibilities

Refer to Section 0 for the Responsibilities of the Commissioning Coordinator, Outage Coordinator, Switching Coordinator, Switching Operator, On-Site Supervisor and a Delegate, with regard to HV Commissioning/Decommissioning.

11.2 General

The procedures relating to work on Non Electrically Connected electrical apparatus generally reflect those applying to the commissioned network.

Construction and Test Authorities (CAs & TAs) are issued instead of Access and Test Permits (APs & TPs).

A Commissioning Coordinator instead of a Switching Coordinator controls the Not Electrically Connected electrical apparatus.

A Commissioning Coordinator shall be appointed for each job involving commissioning using an Authority to Energise and decommissioning using a Decommissioning Notice. A Commissioning Coordinator/Applicant shall submit an application for switching for all commissioning and de-commissioning work, within the relevant lead times.

Commissioning Coordinators shall maintain total involvement and control of the project from start to finish. If a Commissioning Coordinator is replaced by a second Commissioning Coordinator there shall be a detailed handover of current information and relevant documentation to ensure a safe working environment is maintained for project completion. Alternatively, the second Commissioning Coordinator shall request the existing documentation be revoked and issues new documentation for the works to proceed. This applies to the commissioning and decommissioning process.

11.3 Forms

11.3.1 Construction Authority (CA) Form

A form (1666) used for:

- authorisation to work from the Commissioning Coordinator to the On-site Supervisor of each construction group showing work details and disconnection details of the Not Electrically Connected electrical apparatus. A detailed description of work tasks for each construction group is required
- clearance from the on-site supervisor of each construction group to the Commissioning Coordinator that all construction work is completed, and all persons associated with the electrical apparatus have been instructed to treat them as live.

For a typical example of a Construction Authority refer to Appendix A

11.3.2 Test Authority (TA) Form

A form (1224) used for:

- authority to test (using lethal current) from the Commissioning Coordinator to the On-site Supervisor of each test group showing testing details and disconnection details of the Not Electrically Connected electrical apparatus. A detailed description of test work for each test group is required
- clearance from the On-site Supervisor of the test group to the Commissioning Coordinator that all test work is completed, and all persons associated with the electrical apparatus have been instructed to treat them as live.

For a typical example of a Test Authority refer to Appendix A.

11.3.3 Commissioning Programme

A document prepared by the Commissioning Coordinator which contains the individual activities to be carried out on a step by step basis to commission the Not Electrically Connected electrical apparatus. The programme includes the names and roles of all groups involved, timing, permits and switching, as well as any decommissioning that is required. The requirement for a commissioning programme shall be negotiated between the Outage Coordinator and the Commissioning Coordinator.

For a typical example of a Commissioning Programme refer to Appendix B.

11.3.4 Authority to Energise (AE) Form

A form (282) used as authorisation from the Commissioning Coordinator to the Switching Coordinator signifying that the identified electrical apparatus may now be energised..

For a typical example of a Authority to Energise refer to Appendix A

11.3.5 Decommissioning Notice (DN) Form

A form (1667) used as authorisation from a Switching Coordinator to a Commissioning Coordinator, signifying that specific electrical apparatus has been disconnected by an approved method and now considered Not Electrically Connected.

For a typical example of a Decommissioning Notice refer to Appendix A.

11.3.6 Decommissioning Notice Attachment A Form

A form (2154) used for:

- Authorisation to work on Decommissioned electrical apparatus from the Commissioning Coordinator to the On-site Supervisor of a work group. This form is attached to the associated Decommissioning Notice which specifies the electrical apparatus has been disconnected by approved methods and considered Not Electrically Connected.
- Clearance from the on-site supervisor of a work group to the Commissioning Coordinator that all work is completed

For a typical example of a Decommissioning Notice Attachment A refer to Appendix A.

11.4 Commissioning

11.4.1 Commissioning Process

Commissioning is the process of connecting Not Electrically Connected electrical apparatus to the commissioned network. This includes:

- all pre-energisation checks/tests that have been completed, and
- the transfer of responsibility from a Commissioning Coordinator to a Switching Coordinator, and
- when required:
  - electrical apparatus to be energised, and
  - post-energisation checks/tests to be completed.

11.4.2 HV electrical apparatus is commissioned when:

- Switching Coordinator receives an Authority to Energise form from the Commissioning Coordinator (refer Section 11.4.3.1) or
- On-Site Supervisor receives clearance from Switching Coordinator to energise a pole transformer (refer Section 11.4.3.2) or

- Switching Coordinator revokes Work Authority from Live Line on-site supervisor following the installation of electrical apparatus as per Section 11.4.3.3 or
- Switching Coordinator receives advice from Recipient that Access Permit is surrendered as per Permit as per Section 11.4.3.3

11.4.3 Commissioning Methods

There are four approved commissioning methods:

1. Using an Authority to Energise, preferable for all situations listed in 11.4.3.1
2. Using a Switching Sheet to construct and commission a pole transformer as described in 11.4.3.2
3. Using approved Live Line methods as described in 11.4.3.3.
4. Using an Access Permit (AP) as described in 11.4.3.4

A Commissioning Coordinator shall be appointed for method 1 listed above.

11.4.3.1 Commissioning Using an Authority to Energise (Refer to Fig 11.1)

The Commissioning Coordinator shall:

- submit a switching application to the Outage Coordinator.
- prepare a commissioning programme, refer to Section 11.3.3
- issue each work group with Construction / Test Authorities as required and ensure the application of earths and other precautions, refer to Section 11.8.3
- record the issue and surrender of all related Construction Authorities and Test Authorities on an Authority to Energise form

During the commissioning process SAHV procedures shall take precedence, as follows:

- prior to issue of an Access Permit/Test Permit ensure all Construction Authorities and Test Authorities are to be recovered
- once an Access Permit / Test Permit is issued, no further Construction or Test Authorities may be issued
- an Access Permit / Test Permit and Authority to Energise can be in effect at the same time
- In addition to existing network isolation points, Access / Test Permits shall also list new isolation points that may be created as part of the works.

When electrical apparatus is ready to be commissioned, the Commissioning Coordinator shall:

- ensure all Construction Authorities and Test Authorities on issue have been recovered.
- confirm all pre-energisation checks/tests have been successfully completed. If unable to complete all pre-energisation checks/tests, they shall be recorded in the Abnormalities section on the Authority to Energise
- Ensure all remaining earths are recorded on the related Authority to Energise
- be on site for a final check before authorising the Authority to Energise or appoint a Delegate
- if a Delegate is appointed, a detailed handover of current information and relevant documentation is mandatory.
- endorse the Authority to Energise.

11.4.3.1.1 When a Construction Authority is required for electrical work:

Typical examples where Construction Authorities are required are:

- installation of Transmission, Zone and C& I substation HV electrical equipment
- stringing HV overhead conductors
- jointing / terminating underground cables.

Typical examples where Construction Authorities are NOT required are:

- delivery of transformers to site
- civil works such as:
- earthing
- standing poles
- laying conduits
- pulling in cables

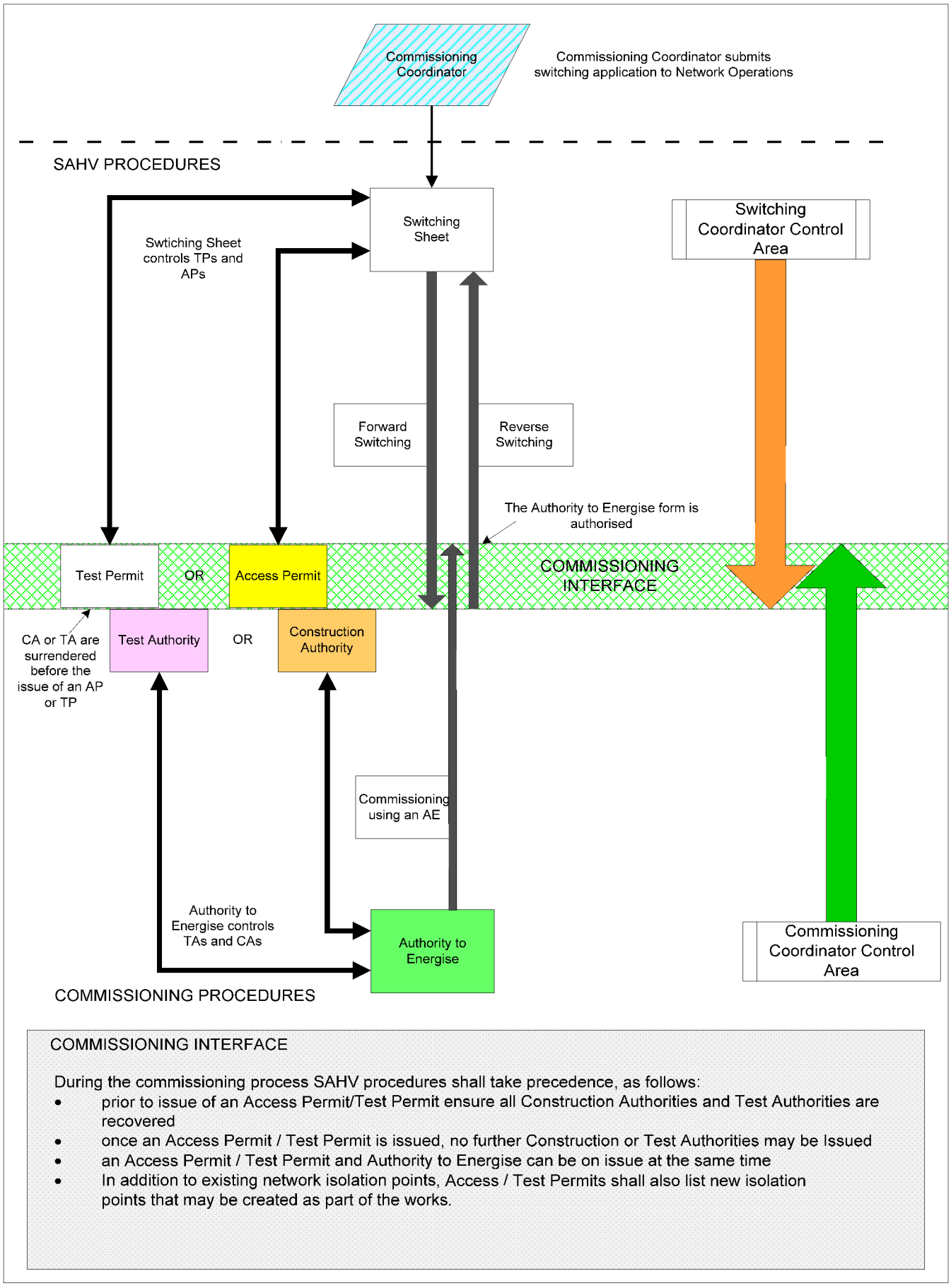


Fig 11.1 Commissioning Using an Authority to Energise

11.4.3.2 Construct and Commission a Pole Transformer

Construction and commissioning a pole transformer without an Authority to Energise shall only be carried out when all the disconnection points are on the transformer pole. (Fig 11.2)
(Refer to Section 11.8.3 in regard to the application of earths and other precautions.)

The pole transformer may be previously erected but shall remain Not Electrically Connected until the commissioning process takes place.

The following work shall be carried out on the day of commissioning:

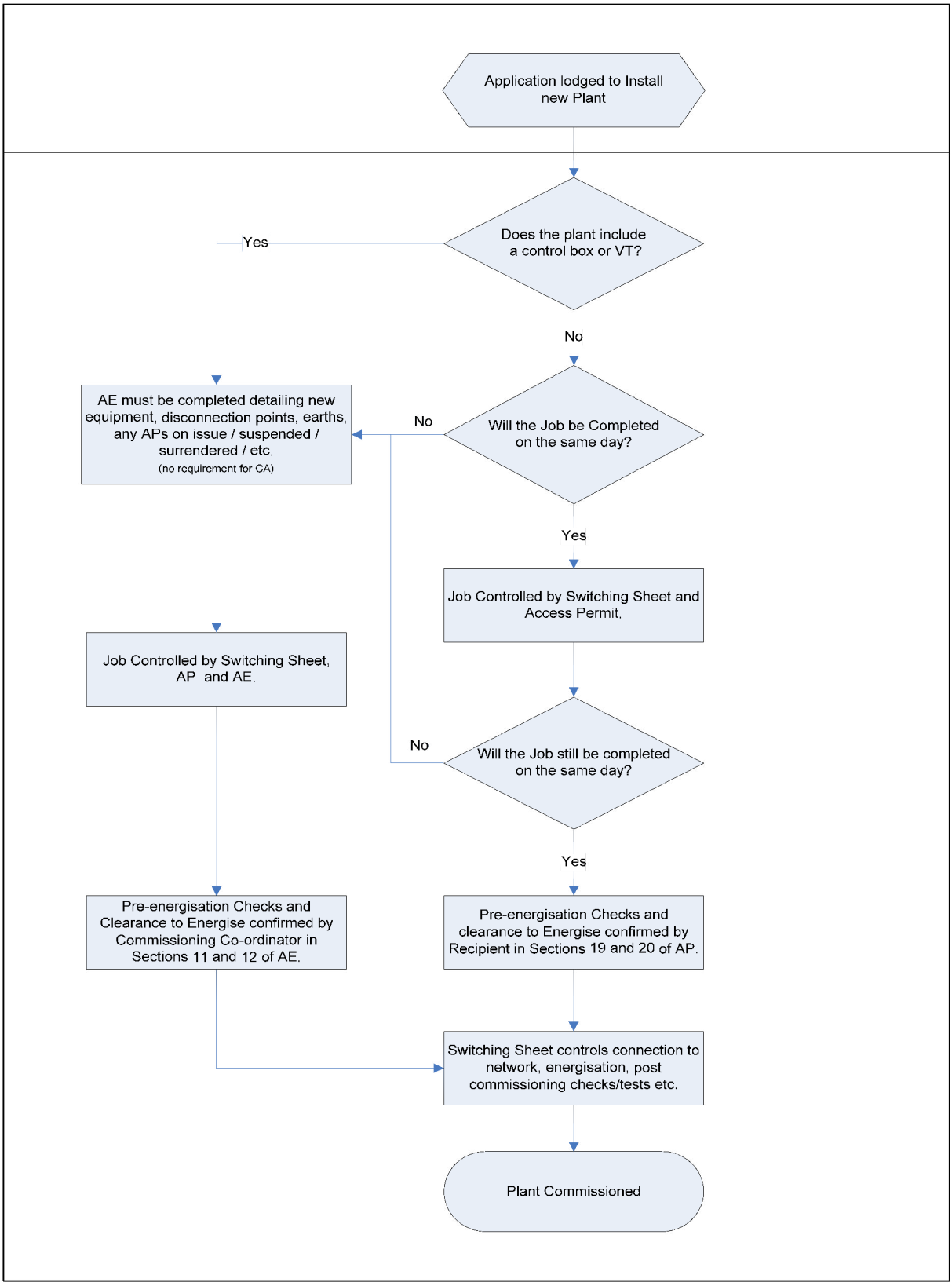
- all the required pre-energisation checks/tests
- make the connection between the energised commissioned network and the Not Electrically Connected electrical apparatus
- energise the new pole transformer and associated equipment
- post – energisation checks/tests are to be completed

A switching sheet shall be used when energising the pole transformer to ensure commissioning is performed in a controlled and coordinated manner.

The following item shall appear on the sheet:

Item	Location	Apparatus	Action	Time
	Switching Coordinator		Receive authority from on-site supervisor – that the new pole transformer and associated equipment may be energised	

Fig 11.2 Commissioning a Pole Transformer



11.4.3.3 Commissioning Using Approved Live Line Methods

Approved Live Line methods can be used to erect and commission the following electrical apparatus via a Work Authority issued under a reclose block or a switching sheet: (Refer to Fig 11.3)

- air break switches
- manually operated gas insulated load break switches
- temporary air break switches
- temporary links
- temporary flying shackles.

Approved Live Line methods can also be used to erect and commission the following using a switching sheet and an Authority to Energise:

- any HV electrical apparatus that includes a control box and/or voltage transformer (the HV electrical apparatus can only be installed with protection disabled)

(Refer to Section 11.4.3.1- Commissioning using an Authority to Energise.)

A Secondary System Works Program is required to apply protection settings for any HV electrical apparatus that includes a control box and/or voltage transformer.

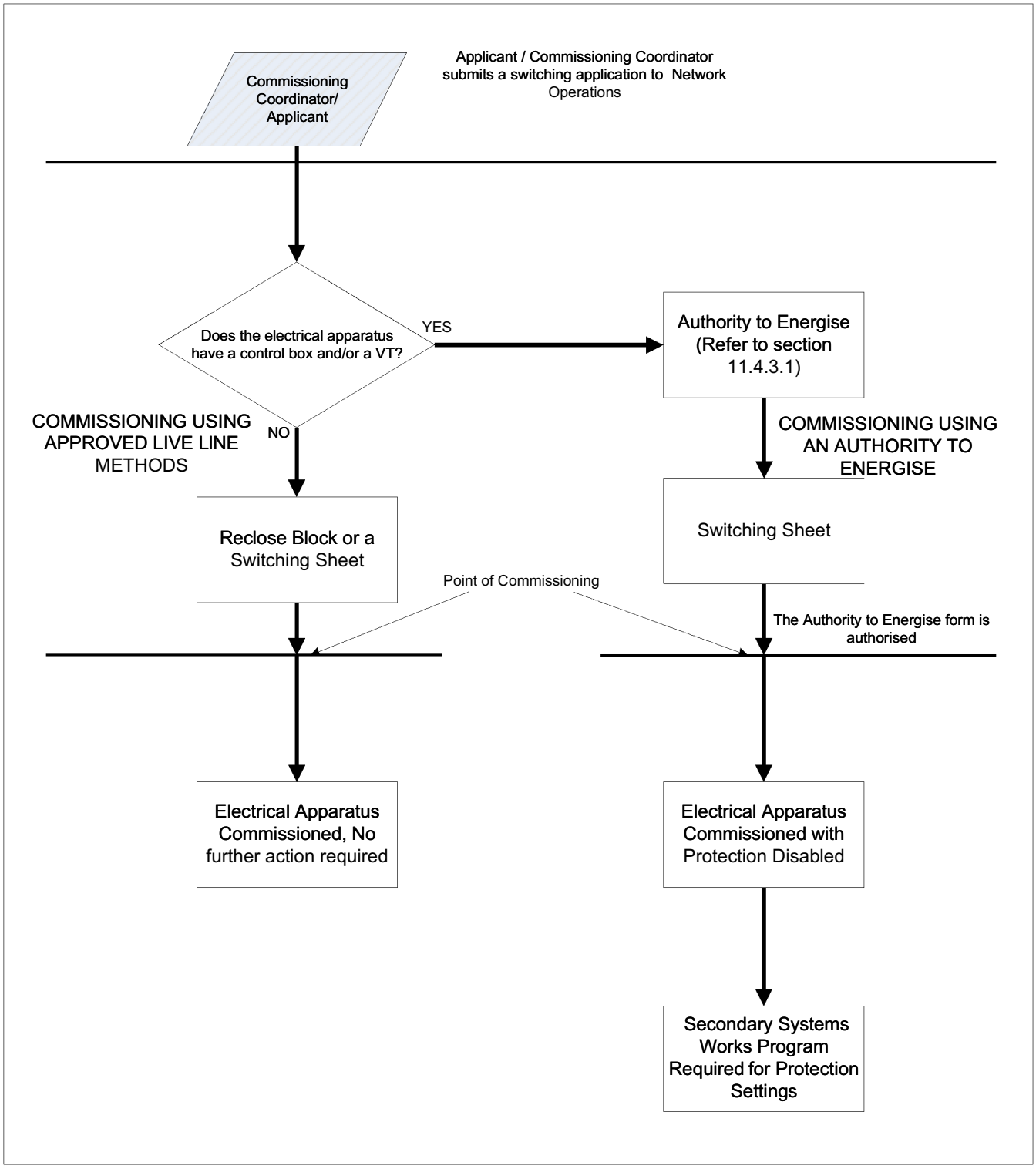


Fig 11.3 Commissioning Using approved Live Line Methods

11.4.3.4 Constructing and Commissioning Overhead Electrical Apparatus using an Access Permit

An Access Permit may be used to control the connection of non-commissioned overhead electrical apparatus (e.g. O/H mains, SP, ABS, etc.) to the commissioned HV network. (Refer Fig 11.4)

The Access Permit may only be used as the authority to commission the electrical apparatus, provided:

- all electrical work (refer Section 11.4.3.1.1) on the non-commissioned overhead electrical apparatus, including connection to the commissioned network and energising is carried out on the same day.
- in addition to existing network isolation points, the Access Permit shall also list new isolation points that may be created as part of the works.
- earths applied to the non-commissioned electrical apparatus shall be recorded in section 16 of the Access Permit as working earths
- section 20 of the Access Permit is endorsed by the recipient to confirm the pre-energisation checks/tests on the non-commissioned electrical apparatus have been successfully completed.

If due to unforeseen circumstances the electrical apparatus cannot be energised on the same day, it shall be left disconnected from the commissioned network using an approved method as per table 11.1 and the Access Permit surrendered . Section 11.4.3.1 - Commissioning using an Authority to Energise shall then apply to complete the work.

For any HV overhead electrical apparatus that includes a control box and/or voltage transformer, refer to section 11.4.3.1 – Commissioning using an Authority to Energise.

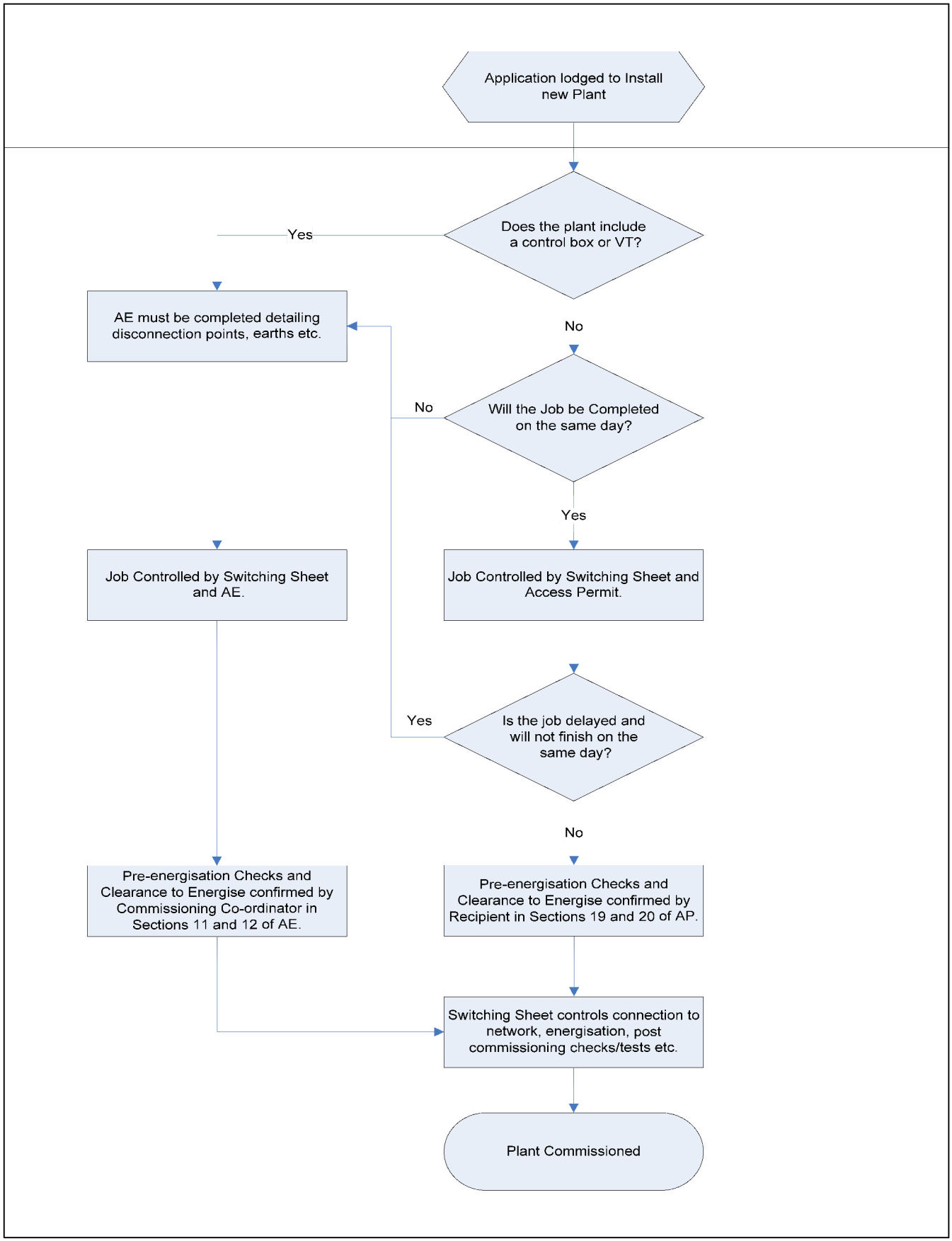


Fig 11.4 Commissioning Using an Access Permit

11.4.4 Connecting to Transmission, Zone or C & I Substations

A Substations Commissioning Coordinator shall be appointed to oversee and authorise the connection of substation electrical apparatus for Transmission, Zone or relay operated C & I Substations..

When connecting an Overhead or Underground feeder to electrical apparatus in Transmission, Zone or relay operated C & I Substations, a Substations Commissioning Coordinator shall be appointed to :

- be responsible for substation works prior to any feeder connection.
- be responsible for the coordination of the connection between the feeder and substation electrical apparatus.

A Commissioning Coordinator from the field workgroup shall:

- consult with the appointed Commissioning Coordinator from Substations within an appropriate lead time prior to the feeder connection..
- be responsible for feeder works prior to connection.

11.4.5 Labelling

The Commissioning Coordinator *will* ensure that all equipment and apparatus referred to in the Authority to Energise and associated Construction and Test Authorities is correctly and permanently labelled.

In the event that permanent labels are not yet available, temporary labels may be used. The text of any temporary labels must be identical to the proposed permanent labels and placed in a manner to correctly and unambiguously indicate the equipment to which it refers.

The Commissioning Coordinator *will* ensure that at the time of endorsing the Authority to Energise, all equipment and apparatus to be Electrically Connected is correctly and permanently labelled in accordance with the Substation Design Standard (BMS2168). Temporary labels should not be used on equipment to be Electrically Connected unless exceptional circumstances exist.

11.5 Decommissioning

11.5.1 Decommissioning Process

Decommissioning is the process of isolating, electrically disconnecting electrical apparatus from the commissioned network by an approved method and where applicable earthing that apparatus, , and the transferring of responsibility for the electrical apparatus from a Switching Coordinator to a Commissioning Coordinator.

There are three approved decommissioning methods:

1. Using a Decommissioning Notice, listed in 11.5.1.1
2. Using an Access Permit (AP) listed in 11.5.1.2
3. Using an Approved Live Line Method listed in 11.5.1.3.

A Commissioning Coordinator shall be appointed for method 1 listed above.

11.5.1.1 Using a Decommissioning Notice

This Decommissioning method is used when electrical apparatus will remain disconnected on site. A Commissioning Coordinator shall be appointed prior to decommissioning (refer to Fig 11.5). The Commissioning Coordinator using an approved method of disconnection as per table 11.1 shall:

- Prepare a Decommissioning Notice and provide it to the Switching Operator

- Submit a switching application with a copy of the Decommissioning Notice to the Outage Coordinator.

When the electrical apparatus is to be decommissioned, the Switching Coordinator shall:

- Confirm disconnection as per Decommissioning Notice
- Approve the authorisation of the Decommissioning Notice.

The Switching Operator on behalf of the Switching Coordinator must then authorise the Decommissioning Notice. More than one copy of the Decommissioning Notice may be required when several locations are involved.
Where practical the Decommissioning Notice should be placed on or near the Not Electrically Connected electrical apparatus.

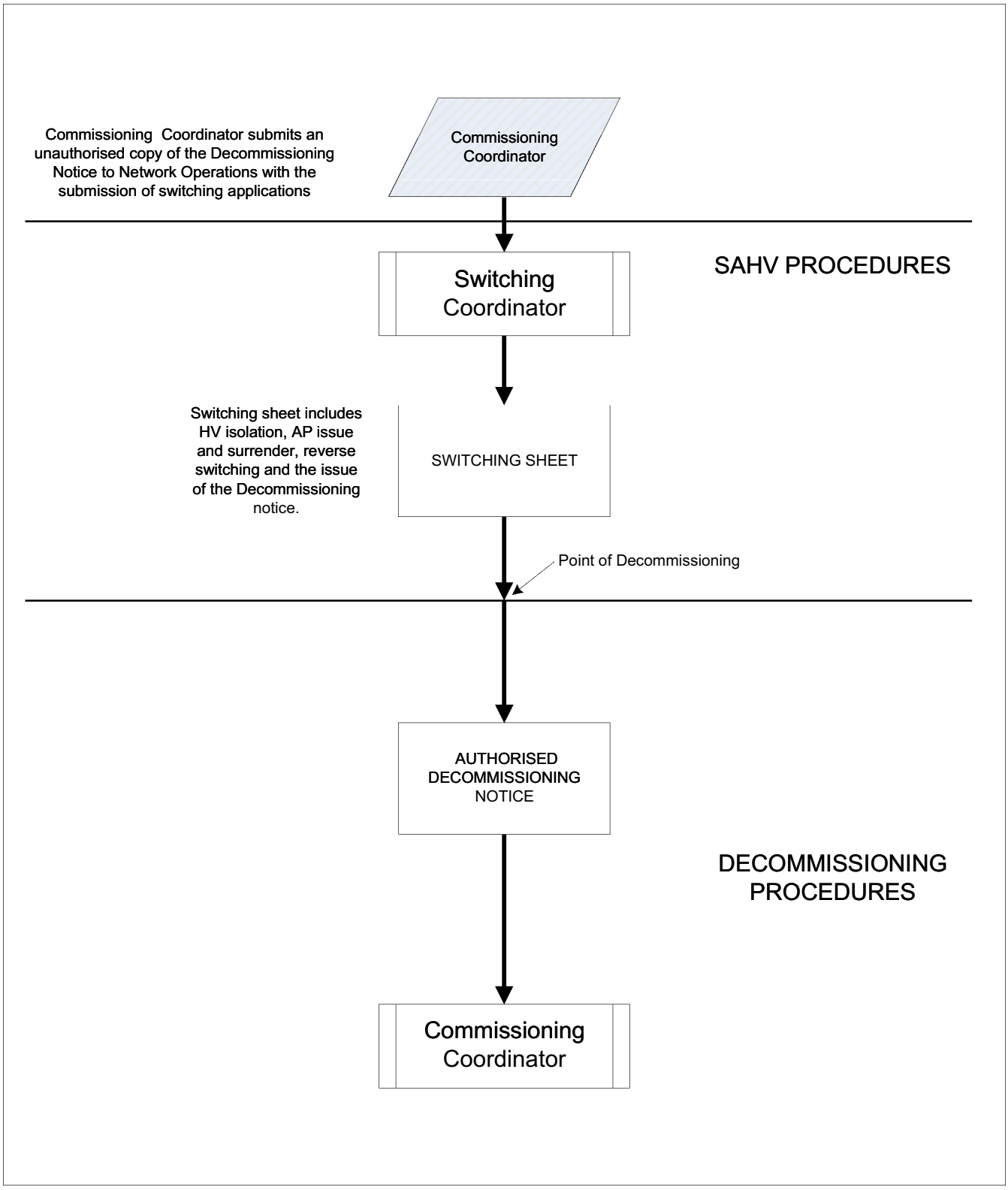


Fig 11.5 Using a Decommissioning Notice (Electrical Apparatus Left on Site)

11.5.1.2 Using an Access Permit.

An Access Permit/s can be used to allow the disconnection and recovery of electrical apparatus on the same day, (Refer to Fig 11.6) The Access Permit may be used as the authority to decommission the electrical apparatus, provided:

- the electrical apparatus is physically removed on the same day
- if operator earths have to be removed from the electrical apparatus to be recovered, approval is obtained from the Switching Coordinator
- the associated switching sheet includes items to check that the electrical apparatus has been suitably removed from service.

If due to unforeseen circumstances the electrical apparatus cannot be removed on the same day, it shall be disconnected from the commissioned network using an approved method as per table 11.1 and the procedures for decommissioning using a Decommissioning Notice shall apply.

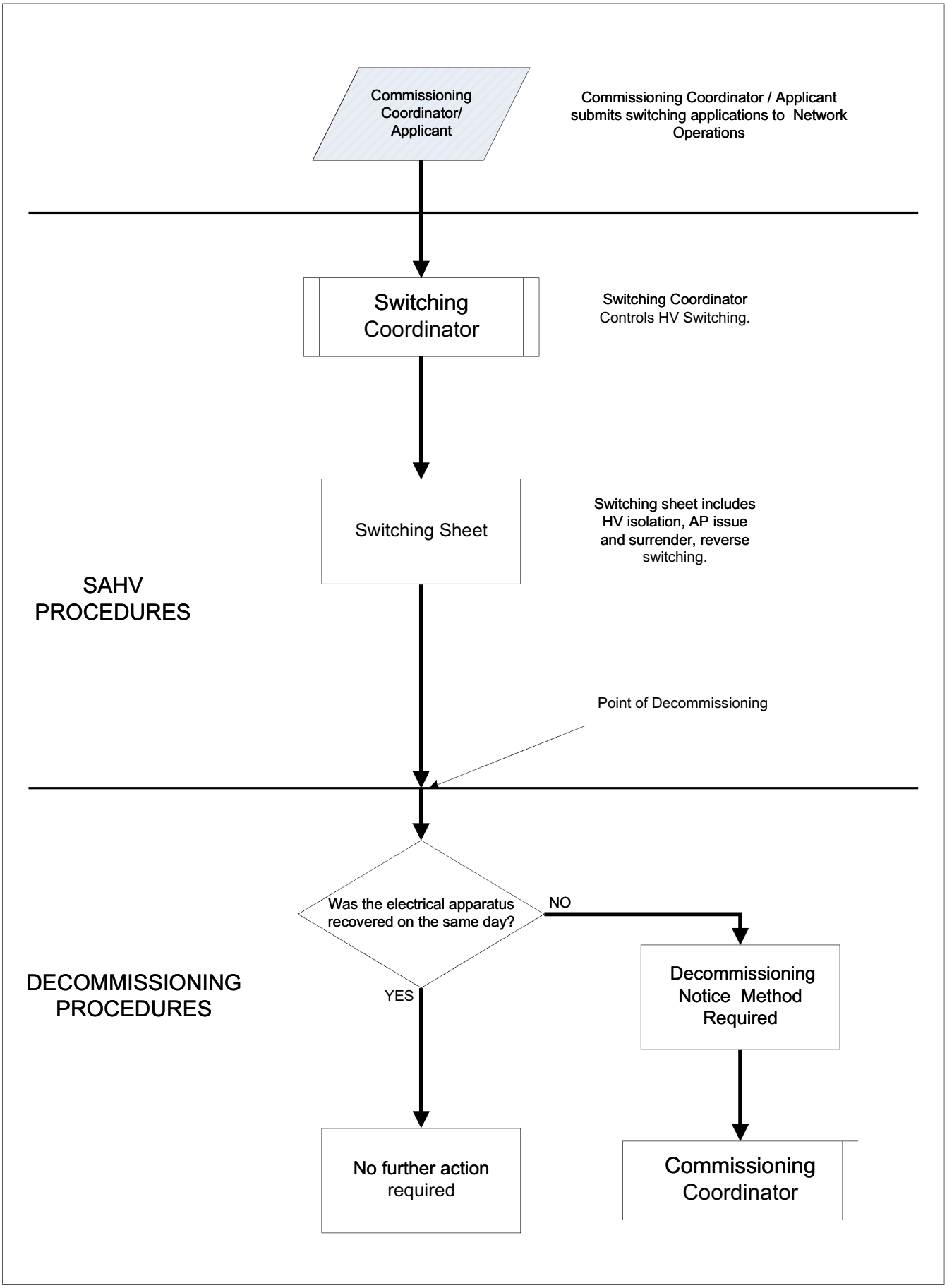


Fig 11.6 Decommissioning Using an Access Permit

11.5.1.3 Using an Approved Live Line Method

Approved Live Line methods may be used to disconnect and recover electrical apparatus on the same day. (Refer to Fig 11.7)

Approved Live Line methods may be used to recover the following electrical apparatus via a Work Authority associated with a reclose block or a switching sheet:

- air break switches
- manually operated gas insulated load break switches
- temporary air break switches
- temporary links
- temporary flying shackles

HV electrical apparatus that includes a control box and/or voltage transformer and is physically removed on the same day by approved Live Line methods may be controlled using a switching sheet.

If due to unforeseen circumstances the electrical apparatus cannot be removed on the day, it shall be disconnected from the commissioned network using an approved method as per table 11.1 and the procedures for decommissioning using a Decommissioning Notice shall apply.

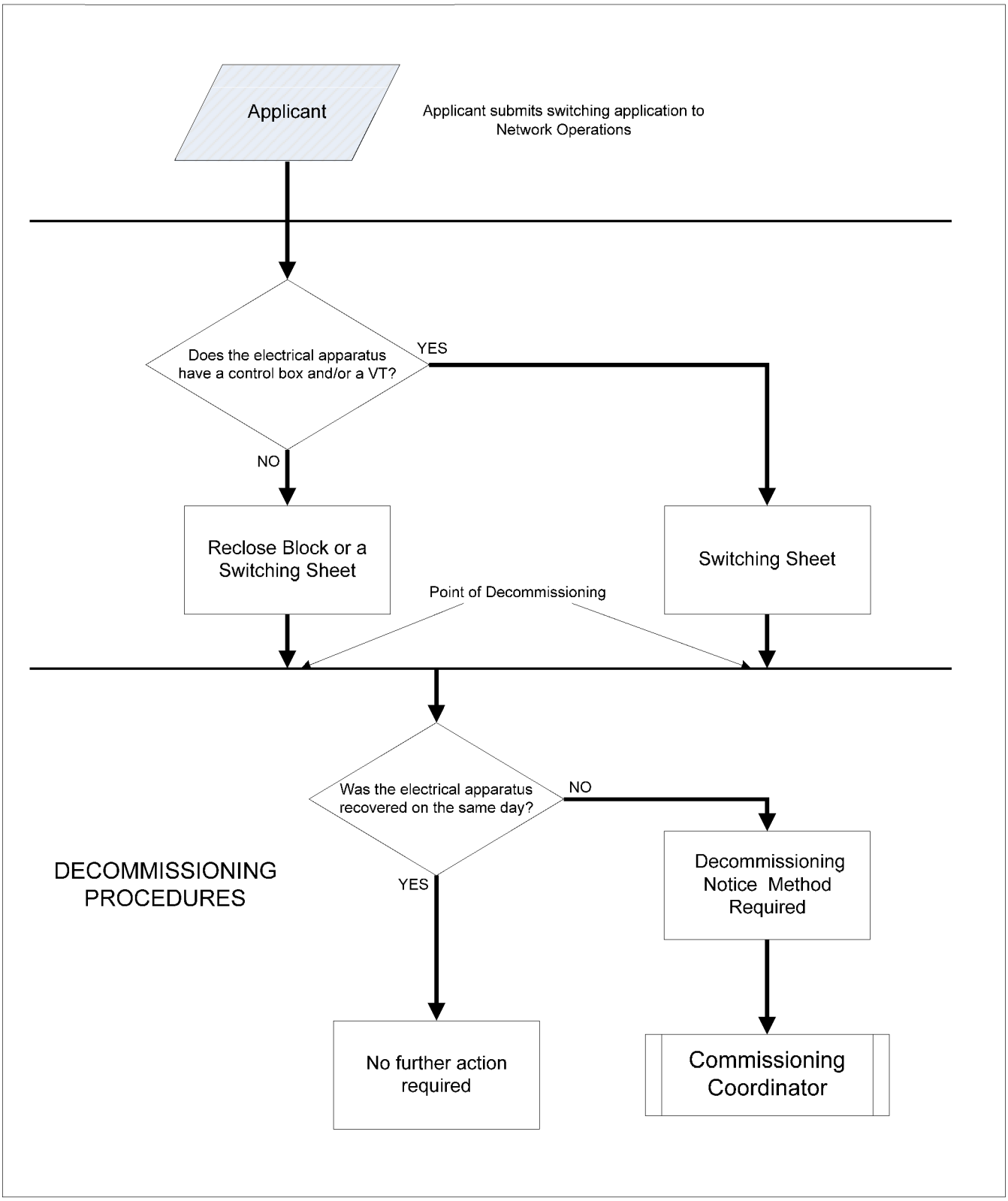


Fig 11.7 Decommissioning Using Approved Live Line Methods

11.5.2 Temporary Decommissioning

Follow procedures for Decommissioning refer to Section 11.5.1.1
The electrical apparatus is not removed from any operating diagrams (but pinned/tagged accordingly)
For Commissioning refer to Section 11.4.3.1

11.6 Working on Decommissioned Electrical Apparatus

A Commissioning Coordinator shall be appointed to coordinate all work on decommissioned apparatus.
A Decommissioning Notice and Decommissioning Notice Attachment A are required for all work on Not Electrically Connected apparatus that will not be recommissioned in the foreseeable future.

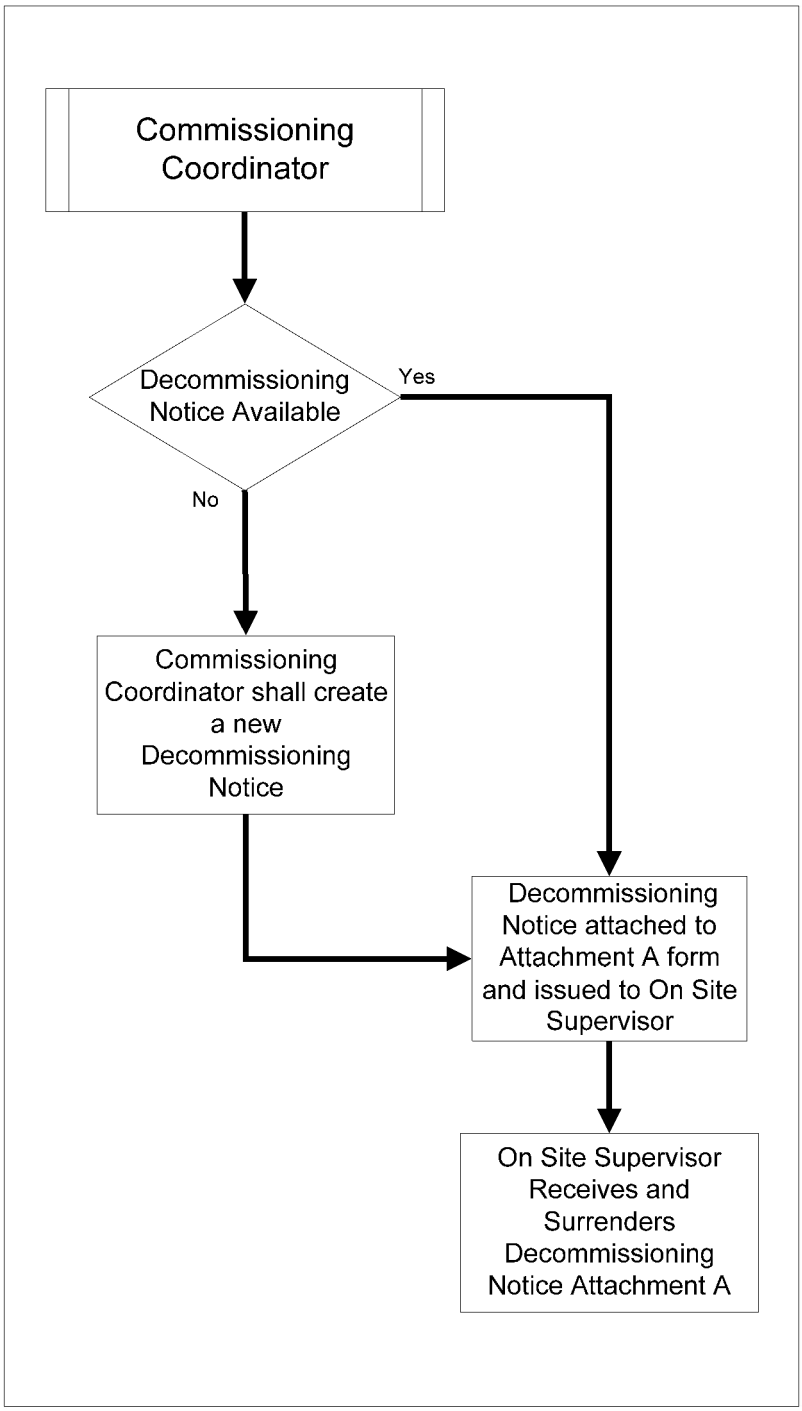


Fig 11.8 Working on Decommissioned Electrical Apparatus

If an existing Decommissioning Notice is available, the Decommissioning Notice is attached to Attachment A form, and shall be issued to an On Site Supervisor (who holds a current electrical licence) for work on the decommissioned network.

If a Decommissioning Notice is not available:

- a Commissioning Coordinator shall issue and endorse a new Decommissioning Notice
- a Switching Coordinator is not required to approve the authorisation of the Decommissioning Notice

The Commissioning Coordinator shall:

- Confirm the electrical apparatus to be worked on is disconnected as per table 11.1
- Confirm the electrical apparatus is disconnected as per Decommissioning Notice
- Refer to Section 11.8.3 in regard to the application of earths and other precautions
- Record earthing on the Decommissioning Notice
- Issue a Decommissioning Notice and Decommissioning Notice Attachment A to the On Site Supervisor

11.6.1 Working on Decommissioned and Commissioned Electrical Apparatus at the same time

Refer to Appendix A14 and A15 for application of this procedure.
For work on commissioned electrical apparatus SAHV procedures apply.
For work on decommissioned electrical apparatus Decommissioning procedures shall apply, refer to Section 11.6
An item on a switching sheet is required to confirm the On Site Supervisor has received a Decommissioning Notice and Decommissioning Notice Attachment A before the Access Permit has been issued.

11.7 Recommissioning of previously decommissioned electrical apparatus

11.7.1 Recommissioning

A Commissioning Coordinator shall be appointed to coordinate the recommissioning of .
The Commissioning Coordinator shall:

- destroy the original Decommissioning Notice
- follow normal commissioning procedures for the electrical apparatus to be recommissioned, refer to Section 11.4.

11.7.2 Partial Recommissioning

If Not Electrically Connected electrical apparatus (for example an O/H transmission line) is to be only partially recommissioned. Refer to Appendix A16 for application of this procedure.
The Commissioning Coordinator shall:

- destroy the original Decommissioning Notice
- prepare a new Decommissioning Notice/s to reflect the changed isolation for the part/s to remain Not Electrically Connected,
- a Commissioning Coordinator shall issue and endorse that new Decommissioning Notice
- a Switching Coordinator is not required to approve the authorisation of that Decommissioning Notice
- follow commissioning procedures for the part(s) to be recommissioned, refer to Section 11.4.

11.8 Other Issues

11.8.1 Disconnected from the Commissioned Network

Not Electrically Connected electrical apparatus shall be disconnected by an approved method as per Table 11.1.

Other precautions must be used, wherever possible.

Apparatus	Approved Disconnection Method
Overhead	• Bridges removed completely • Span(s) of O/H mains removed
Underground	• Cables Disconnected and removed • Cables cut clear
Substation	• Busbars removed • Blades removed completely • Cables disconnected and removed • Cables cut clear • Span(s) of O/H mains removed
Low Voltage	• Bridges removed completely • Cables disconnected • Cables cut clear • Cables/Leads/Flexible connectors removed

Table 11.1

11.8.2 Commissioning Procedures Involving HV Electrical Apparatus with Spare Switches

11.8.2.1 Non Withdrawable HV Electrical Apparatus

A spare switch is considered commissioned and under the control of the Switching Coordinator if any part of the switchgear associated with that spare switch is electrically connected to the network.

Any electrical apparatus that is attached to that spare switch is also considered commissioned.

When connecting electrical apparatus to or disconnecting from that spare switch, or working / testing on electrical apparatus that is attached to that spare switch an Access Permit / Test Permit shall be used.

All Test Authorities and Construction Authorities shall be surrendered before an Access Permit **/** Test Permit can be issued.

In addition to existing network isolation points, Access Permits / Test Permit shall also list new isolation points that may be created as part of the new works.

A surrendered Access Permit / Test Permit and an authorised Authority to Energise shall be required before new electrical apparatus can be energised.
DNOBs shall be attached to all spare switches, wherever possible

11.8.2.2 Withdrawable HV Electrical Apparatus

The same procedures apply to this section as per Section 11.8.2.1.

11.8.3 Earths and Other Precautions

Not Electrically Connected HV electrical apparatus shall have all phases short-circuited and earthed while work is in progress wherever practicable. Permanent earthing points should be utilised wherever possible.

Where applicable, earths and other precautions placed shall be recorded on the related Construction/Test Authorities, Authority to Energise or Decommissioning Notice.

(Refer to Section 0 for Responsibilities and Definitions for Commissioning Coordinator, On Site Supervisor, Earthing and Other Precautions)

11.8.4 Testing with Lethal Currents on Not Electrically Connected Electrical Apparatus

Before a Test Authority is issued the Commissioning Coordinator shall ensure:

- all construction work on the electrical apparatus under test to cease.
- all Construction Authorities are recovered,.

11.8.5 Numbering

A Commissioning Coordinator shall ensure:

- Each Authority to Energise is uniquely numbered.
- Each Construction Authority and Test Authority associated with that Authority to Energise shall be numerically linked as per example below.

Example:

- Authority to Energise No 123123
- Construction Authority No 123123 - 1
- Test Authority No 123123 - 2

11.8.6 Location of Construction Authorities

A Commissioning Coordinator shall ensure:

- Construction/Test Authorities are on site prior to the commencement of any work
- Construction/Test Authorities remain on site for the duration of work

11.8.7 Staged Access/Test Permits

Where isolation points for a job change, either physically or in name, then staged permits shall be used, for example:

- cutting an RMU (SC, SG, X site) into an existing underground feeder, where both sections of the cut feeder are **not** expected to be re-energised at the same time
- cutting a Substation (SS Site) into an existing underground feeder, since the name of one of the original isolation points and feeder name will change during the course of the job.

A stage 1 permit shall be issued to the work group requiring access to the electrical apparatus in its initial condition. When the isolation points change, the recipient shall surrender the stage 1 Permit, and then be issued with a stage 2 Permit, with the corrected isolation points. As many stages as are necessary must be used.

Note: A change in a feeder destination label is not considered to be a name change.

Staged permits are not required for example:

- cutting an RMU (SC, SG, X site) into an existing underground feeder, where both sections of the cut feeder are expected to be re-energised at the same time

11.8.8 Projects Involving Secondary Systems

Refer to Section 7.10 on work involving Secondary Systems

11.8.9 Projects Involving HV & LV

For projects that involve HV & LV Not Electrically Connected electrical apparatus (for example, a URD subdivision), a Commissioning Coordinator shall be responsible for commissioning both HV and LV electrical apparatus.

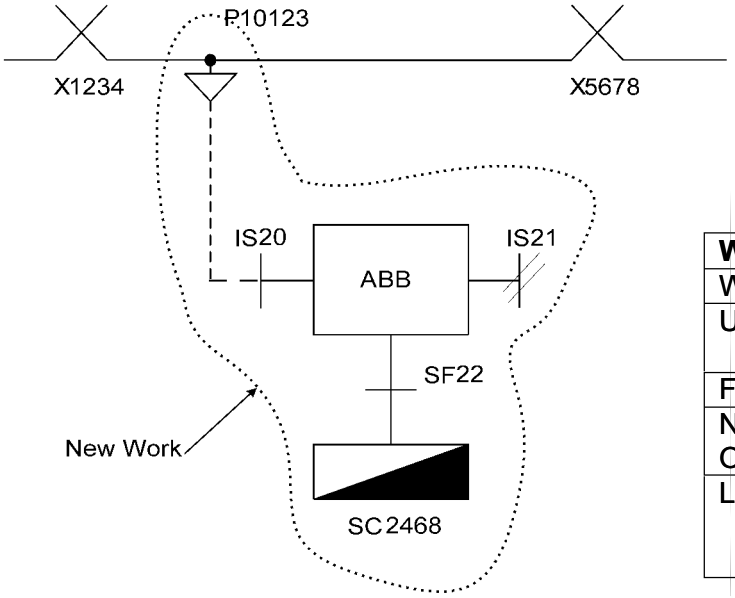
A Commissioning Coordinator shall be responsible for decommissioning projects involving HV and LV electrical apparatus.

11.9 Update of Records

The relevant Switching Coordinator must update the appropriate records and notify the Network Data Officer that the changes to the network have been implemented.

A Examples of HV Commissioning / Decommissioning Procedures

A.1 Commissioning a Padmount Transformer using an AE and Energise by Live Line Methods



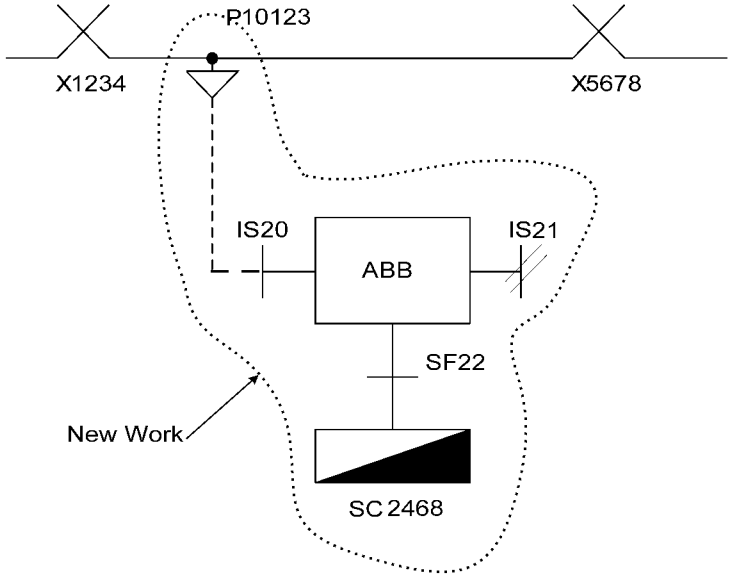
Work Group	Task
W/Group	Install padmount SC2468
Underground	Install and terminate U/G cable
Field Test	HV Cable Test
Network Operations	Forward switching
Live Line	Bridge in U/G pothead to O/H mains to energise SC2468

Typical Procedure

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs padmount[1]
4. Commissioning Coordinator issues CA1 to Underground
5. Underground install and terminate U/G cable at IS20 at SC2468
6. Underground install and terminate U/G cable at P10123 (work is performed outside the exclusion zone)
7. Commissioning Coordinator recovers CA1
8. Commissioning Coordinator issues TA2 to *Field Test*
9. Field Test complete HV cable tests
10. Commissioning coordinator recovers TA2 from *Field Test*
11. Commissioning Coordinator confirms all pre-energisation checks/test complete,
12. Commissioning Coordinator authorises AE for SC2468 and associated U/G cable.
13. Switching Operator carries out switching
14. Switching Operator receives AE from Commissioning Coordinator
15. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
16. Switching Operator checks HV and LV isolators in the open position, including IS21 at SC2468 is secured in the open position, a system lock with DNOB tag placed (switching sheet items)
17. Live Line energises SC2468 using approved Live Line Methods
18. Post-energisation checks completed (as per form 1175)
19. Network Operations update records

[1] A CA is not required for this type of civil work

A.2 Commissioning a Padmount Transformer to the Overhead (using an AE)



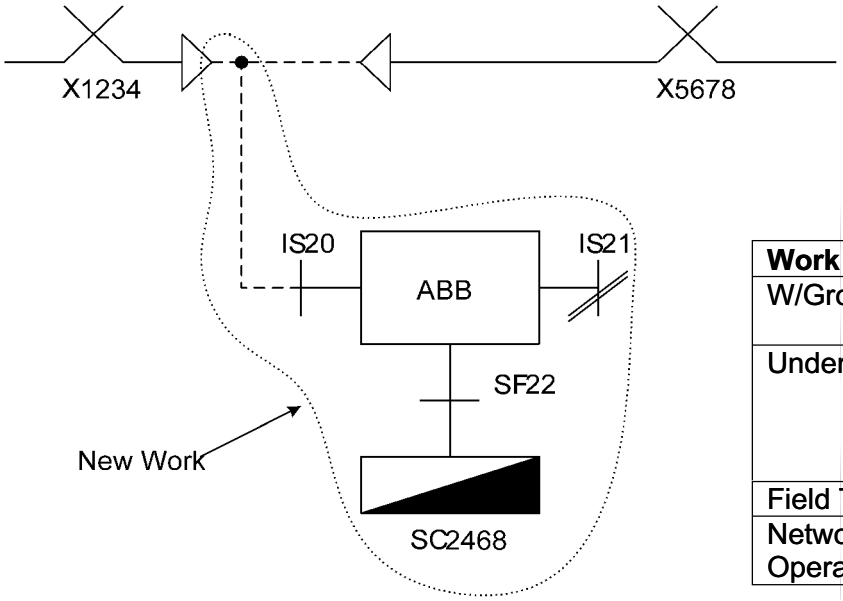
Work Group	Task
W/Group	Install padmount SC2468
Underground	Install and terminate U/G cable
Field Test	HV Cable Test
Network Operations	Forward & Reverse switching
Overhead/ Underground	Bridge in pothead to O/H mains

Typical Procedure
(No LV cables connected to the LV switchboard)

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs padmount[2]
4. Commissioning Coordinator issues CA1 to Underground
5. Underground install and terminates U/G cable at IS20 at SC2468
6. Commissioning Coordinator recovers CA1
7. Commissioning Coordinator checks IS21 at SC2468 open, in earth position, IS21 secured using a system lock with DNOB tag placed
8. Switching Operator carries out forward switching to isolate O/H between X1234 & X5678
9. Isolation points shall include X1234, X5678, SC2468/IS21 and SC2468 LV Switch Check Open and Place DNOB
10. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
11. Switching Operator issues AP1 to Underground to terminate U/G cable and install bridges to connect to the O/H mains at P10123.
12. Underground complete work and surrender AP1
13. .Switching Operator recovers AP1
14. Switching Operator issues TP2 to Field Test
15. Field Test complete HV cable tests
16. Switching Operator recovers TP2
17. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for SC2468 and associated U/G cable.
18. Network Operations receive AE from Commissioning Coordinator
19. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
20. Switching Operator checks the position of HV and LV isolators, including IS21 at SC2468 is secured in the open position, a system lock with DNOB tag placed (switching sheet items)
21. Switching Operator carries out reverse switching (energising new padmount)
22. Post-energisation checks completed (as per form 1175)
23. Network Operations update records

[2] A CA is not required for this type of civil work

A.3 Commissioning a Padmount Transformer to Existing U/G Cable (using an AE)



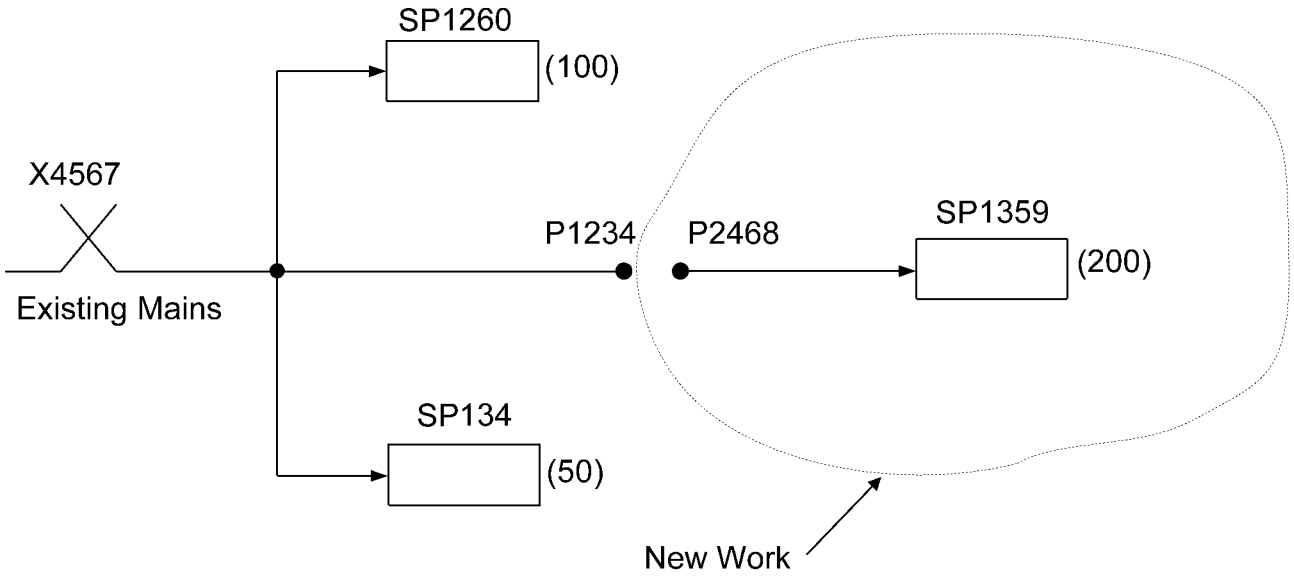
Work Group	Task
W/Group	Install padmount SC2468
Underground	Install and terminate new U/G cable. Tee new U/G cable into existing U/G cable.
Field Test	HV Cable Test
Network Operations	Forward & Reverse switching

Typical Procedure

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs padmount[3]
4. Commissioning Coordinator issues CA1 to Underground to install and terminate U/G cable on IS20 at SC2468
5. Commissioning Coordinator recovers CA1
6. Switching Operator carries out forward switching
7. Isolation points shall include X1234, X5678, SC2468/IS21 and SC2468 LV Switch Check Open and Place DNOB
8. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
9. Switching Operator issues AP1 to Underground to tee in cable to existing U/G network.
10. Underground complete work and surrender AP1
11. Switching operator recovers AP1
12. Switching Operator issues TP2 to Field Test
13. Field Test complete HV cable tests
14. Switching Operator recovers TP2
15. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for SC2468 and associated U/G cable.
16. Network Operations receive AE from Commissioning Coordinator
17. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
18. Switching Operator checks the position of HV and LV isolators, including IS21 at SC2468 is secured in the open position, a system lock with DNOB tag placed (switching sheet items)
19. Switching Operator carries out reverse switching (energising new padmount)
20. Post-energisation checks completed (as per form 1175)
21. Network Operations update records

[3] A CA is not required for this type of civil work

A.4 Commissioning Overhead Mains & Pole Transformer (using an AE)

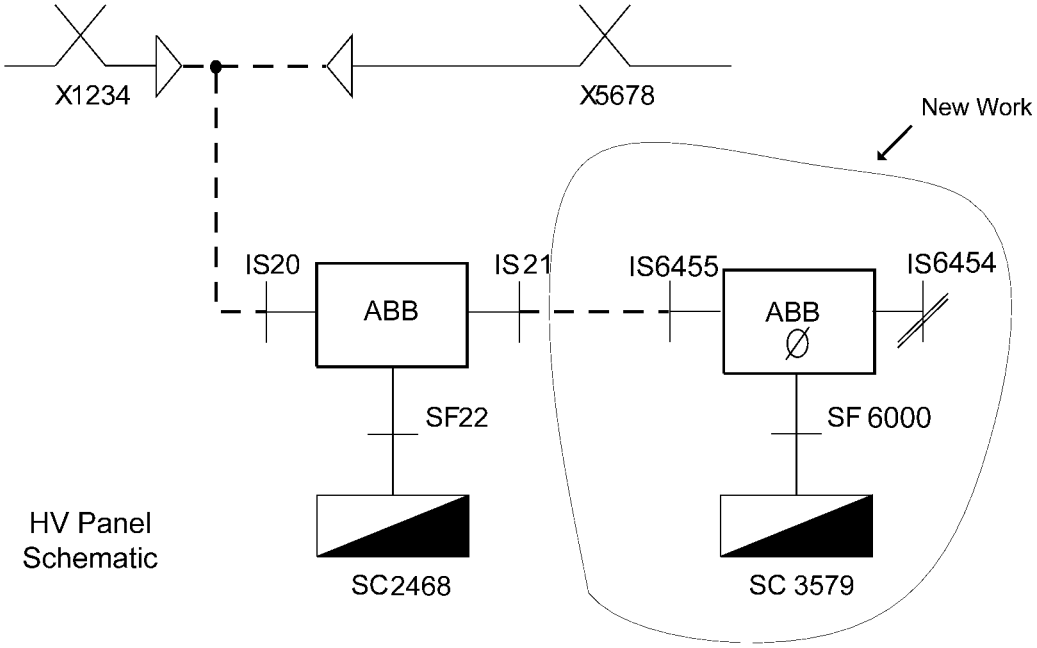


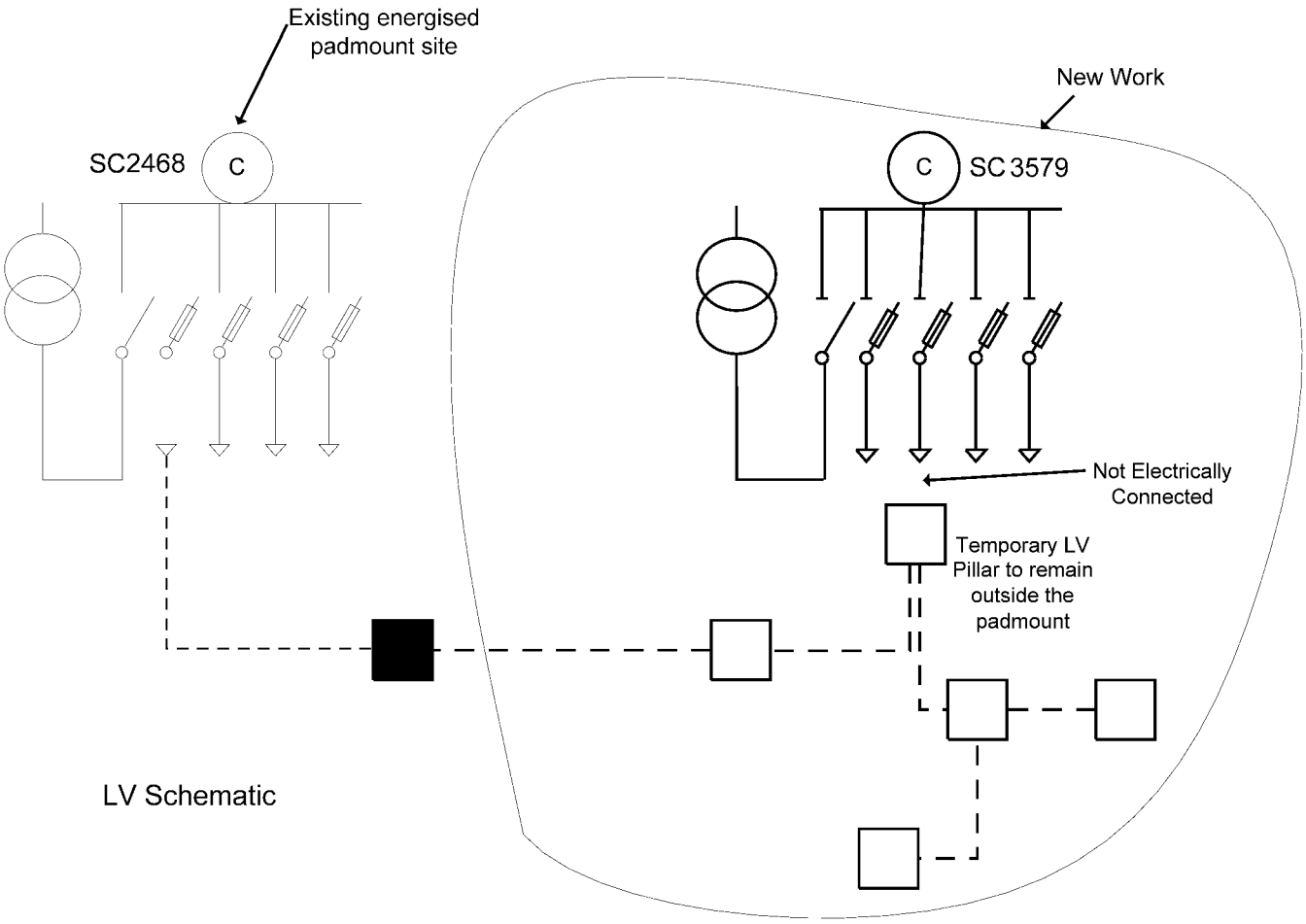
Work Group	Task
Overhead	Erect SP1359 and overhead mains
Network Operations	Forward and Reverse Switching Update records

Typical Procedure

1. Commissioning Coordinator issues CA1 for Overhead to construct new SP1359 and overhead mains (except for last span).
2. Commissioning Coordinator submits switching application to Network Operations.
3. Network Operations arrange switching sheet preparation and authorisation
4. Overhead carries out new construction under CA1(except for last span)
5. Network Operations arrange switching sheet preparation & authorisation
6. Commissioning Coordinator recovers CA1
7. Switching Operator carries out forward switching
8. Isolation points shall include the X4567, SP1260 LV Switch, SP134 LV Switch and SP1359 Check Open and Place DNOB
9. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
10. Switching Operator issues AP1 for Overhead to erect last span of O/H mains
11. Overhead complete work and surrender AP1
12. .Switching Operator recovers AP1
13. Commissioning Coordinator confirms all pre-energisation checks/tests complete, then authorises AE for new construction.
14. Network Operations receive AE from Commissioning Coordinator
15. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
16. Switching Operator completes switching
17. Network Operations update records

A.5 Commissioning a Padmount Transformer with LV Switchboard Not Electrically Connected





A.5 Commissioning a Padmount Transformer with LV Switchboard Not Electrically Connected

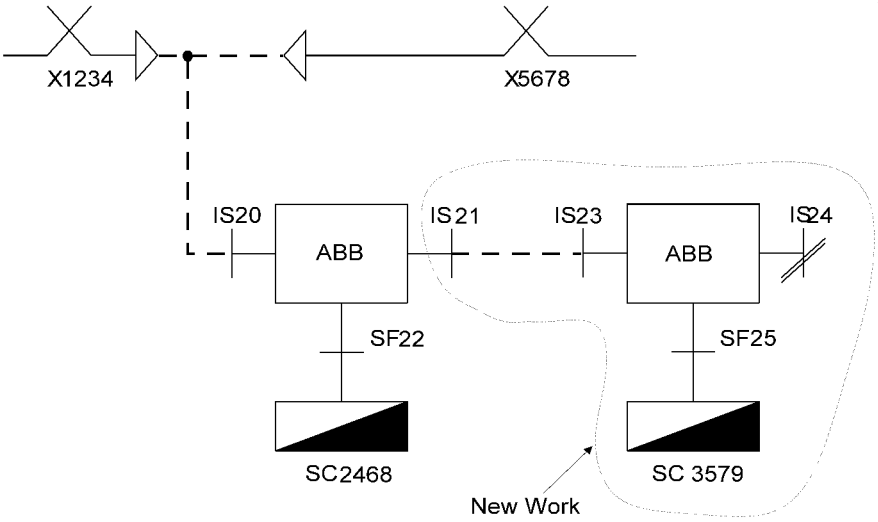
Work Group	Task
W/Group	Install padmount SC3579
Underground	Install and terminate new U/G cable.
Field Test	HV Cable Test
Network Operations	Forward & Reverse switching

Typical Procedure

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs padmount[4]
4. New LV Cables are installed and terminated in LV pillars
5. LV Cables will be connected together in a temporary LV pillar and will remain disconnected from the padmount to comply with Not Electrically Connected definition.
6. LV switching sheet used to connect and energise new LV to the existing LV network
7. Commissioning Coordinator issues CA1 to Underground to install and terminate 11kV U/G cable to IS6455 at SC3579
8. Commissioning Coordinator recovers CA1
9. Switching Operator carries out forward HV switching
10. Isolation points shall include SC2468/IS21, SC3579 LV Switch and SC3579/IS6454 Check Open and Place DNOB
11. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
12. Switching Operator issues AP1 to Underground to terminate U/G cable on IS21 at SC2468.
13. Underground complete work and surrender AP1
14. .Switching Operator recovers AP1
15. Switching Operator issues TP2 to *Field Test*
16. Field Test complete HV cable tests
17. Switching Operator recovers TP2
18. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for SC3579 and associated U/G cable.
19. Network Operations receive AE from Commissioning Coordinator
20. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
21. Switching Operator checks the position of HV and LV isolators, including IS6454 at SC3579 is secured in the open position, a system lock with DNOB tag placed (switching sheet items)
22. Switching Operator carries out reverse switching (energising new padmount)
23. Post-energisation checks completed (as per form 1175)
24. Network Operations update records
25. LV switching is carried to de-energise the temporary LV pillar to allow LV U/G cables to be connected to the LV switchboard for the padmount (LV procedures are followed for LV access)
26. Underground connect LV underground cables to the LV switchboard of the padmount
27. Underground complete LV work and treat LV mains as energised
28. LV switching is carried out to energise the new LV cables and prove phasing

[4] A CA is not required for this type of civil work

A.6 Commissioning a Padmount Transformer to Existing Padmount via Spare Switch (using an AE). No LV Connected to Padmount at the Time of Commissioning



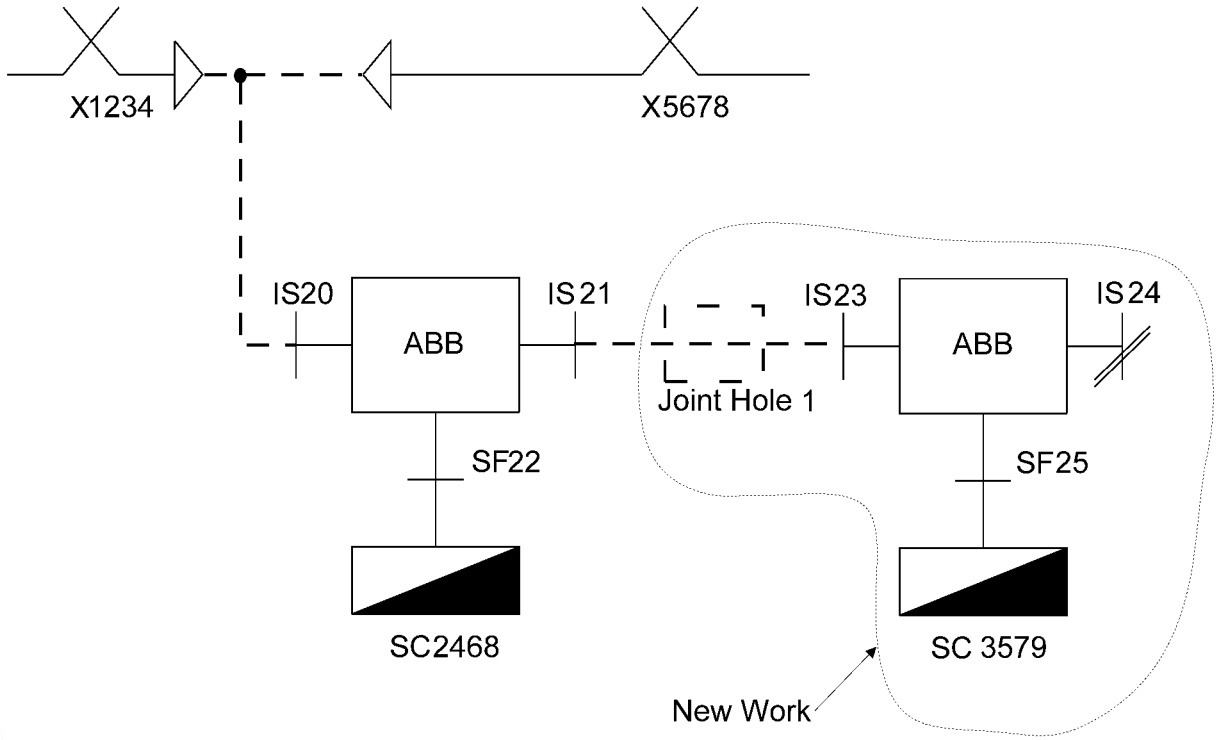
Work Group	Task
W/Group	Install padmount SC3579
Underground	Install and terminate new U/G cable.
Field Test	HV Cable Test
Network Operations	Forward & Reverse switching

Typical Procedure

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs padmount[5]
4. Commissioning Coordinator issues CA1 to Underground to install and terminate U/G cable on IS23 at SC3579
5. Commissioning Coordinator recovers CA1
6. Switching Operator carries out forward switching
7. Isolation points shall include the SC2468/IS21, SC3579 LV Switch and SC3579/IS24 Check Open and Place DNOB
8. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
9. Switching Operator issues AP1 to Underground to terminate U/G cable on IS21 at SC2468.
10. Underground complete work and surrender AP1
11. .Switching Operator recovers AP1
12. Switching Operator issues TP2 to *Field Test*
13. Field Test complete HV cable tests
14. Switching Operator recovers TP2
15. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for SC3579 and associated U/G cable.
16. Network Operations receive AE from Commissioning Coordinator
17. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
18. Switching Operator checks the position of HV and LV isolators, including IS24 at SC3579 is secured in the open position, a system lock with DNOB tag placed (switching sheet items)
19. Switching Operator carries out reverse switching (energising new padmount)
20. Post-energisation checks completed (as per form 1175)
21. Network Operations update records

[5] A CA is not required for this type of civil work

A.7 Commissioning new Cable and SC567 via Spare Cable at Joint Hole 1



Work Group	Task
W/Group	Install padmount SC3579
Underground	Install and Joint new U/G cable.
Field Test	HV Cable Test
Network Operations	Forward & Reverse switching

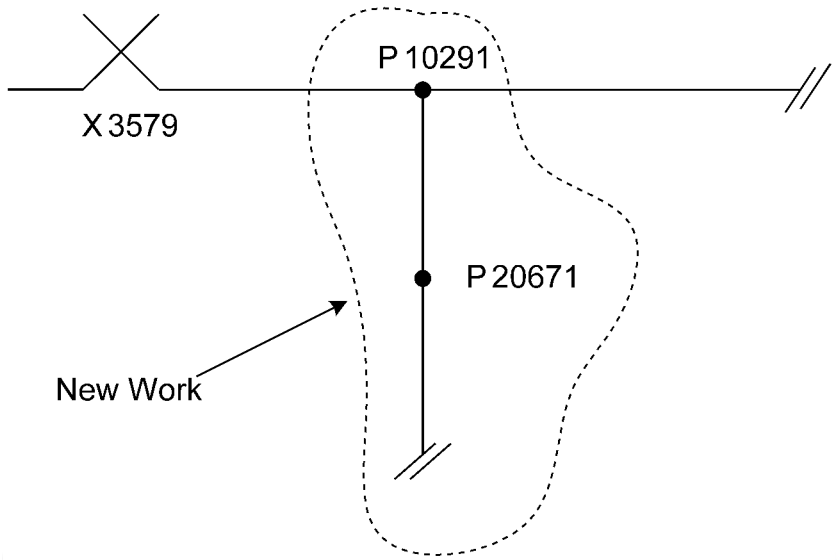
Typical Procedure

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs padmount[6]
4. Commissioning Coordinator issues CA1 to Underground to install and terminate U/G cable on IS23 at SC3579
5. Commissioning Coordinator recovers CA1
6. Switching Operator carries out forward switching
7. Isolation points shall include the SC2468/IS21, SC3579 LV Switch and SC3579/IS24 Check Open and Place DNOB
8. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
9. Switching Operator issues AP1 to Underground to Joint U/G cable in Joint Hole 1.
10. Work in Joint Hole 1 includes Work Practice – Positive Identification & Working on Underground HV Cables

[6] A CA is not required for this type of civil work

11. Underground complete work and surrender AP1
12. .Switching Operator recovers AP1
13. Switching Operator issues TP2 to *Field Test*
14. Field Test complete HV cable tests
15. Switching Operator recovers TP2
16. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for SC3579 and associated U/G cable.
17. Network Operations receive AE from Commissioning Coordinator
18. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
19. Switching Operator checks the position of HV and LV isolators, including IS24 at SC3579 is secured in the open position, a system lock with DNOB tag placed (switching sheet items)
20. Switching Operator carries out reverse switching (energising new padmount)
21. Post-energisation checks completed (as per form 1175)
22. Network Operations update records

A.8 Commissioning an 11 kV Spur Line (using an AE)

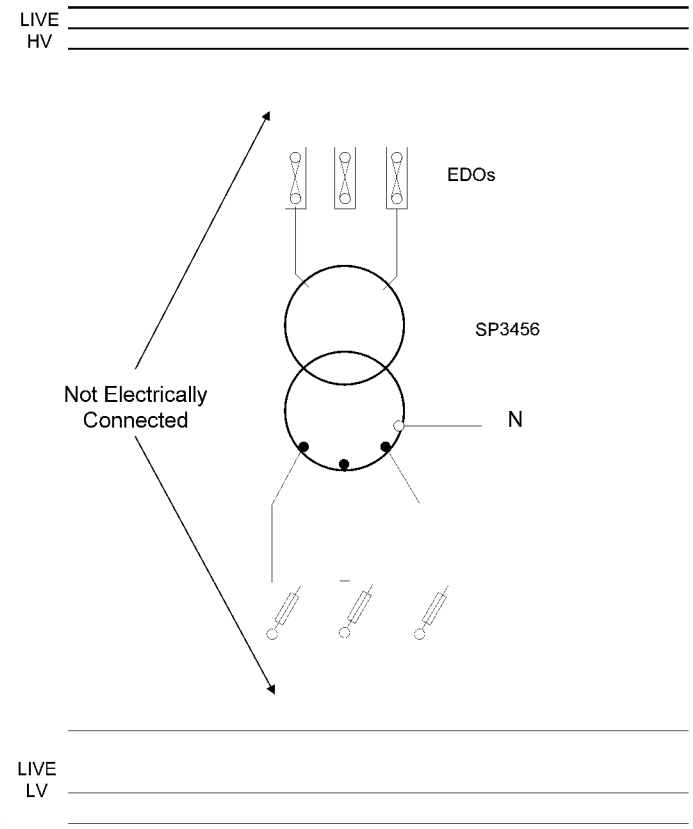


Work Group	Task
Overhead	Construct New 11 kV spur line
Live Line	Bridge in spur line to feeder and energise
Network Operations	Disable/Enable feeder auto-reclose Issue work authority Update records

Typical Procedure

1. Commissioning Coordinator issues CA1 to overhead to construct new spur line.
2. Commissioning Coordinator submits switching application to Network Operations.
3. Network Operations arrange switching sheet preparation and authorisation
4. Overhead carries out new construction under CA1 (new conductors tied around termination pole or attached to temporary cross arm).
5. Commissioning Coordinator recovers CA1 from work group.
6. Network Operations disable auto reclose (switching sheet item).
7. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
8. Network Operations issue WA for Live Line (switching sheet item) to attach new conductors to new termination cross arm.
9. Network Operations revoke WA.
10. Commissioning Coordinator confirms all pre-energisation checks/tests complete, then authorises AE for new spur line.
11. Network Operations receive AE from Commissioning Coordinator
12. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
13. Switching Operator commences reverse switching
14. Live Line Bridge in and energise new conductors (switching sheet item).
15. Network Operations restore auto reclose (switching sheet item).
16. Switching Operator completes switching
17. Network Operations update records

A.9 Construct and Commissioning a Pole Transformer



Work Group	Task
Overhead	Erect pole transformer SP3456 and associated equipment on existing pole. SP3456 remains Not Electrically Connected until day of commissioning
Network Operations	Forward and Reverse switching Update records

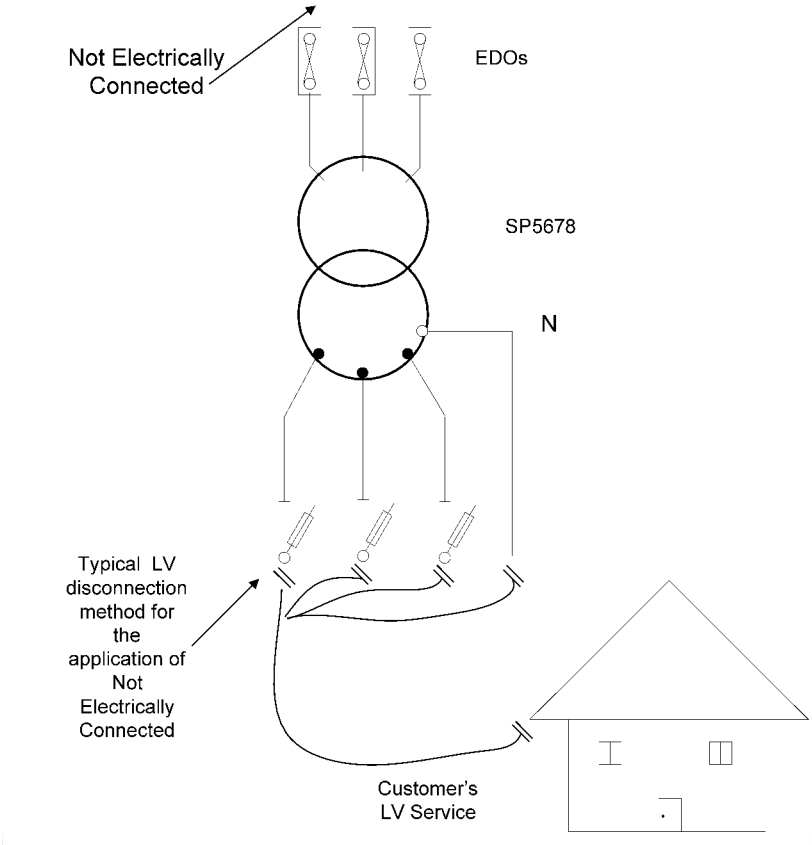
Typical Procedure

1. SP3456 is constructed and remains Not Electrically Connected from the commissioned network until it is required to be commissioned (Refer to Table 11.1 for disconnection methods)
2. Applicant submits switching application to Network Operations
3. Network Operations arrange switching sheet preparation and authorisation
4. Day of commissioning, workgroup checks SP3456 is Not Electrically Connected before commencement of any work
5. Workgroup apply portable earths (section 11.8.3)
6. Switching Operator obtains approval to commence switching
7. Check EDOs open place DNOB and LV fuses in open position and place DNOB (switching sheet items)
8. Issue W/A to work group to carry out next 2 items
9. Live Line leads installed to the top of the EDOs by workgroup (Do not connect to Live HV OHM's)
10. LV leads or bridges installed, including neutral conductor.

11. Revoke W/A from work group
12. Switching Coordinator confirms all pre-energisation checks/test completed (switching sheet item), (Checks/tests completed as per form 1175).
13. Receive authority from on-site supervisor – that the new pole transformer and associated equipment may be energised (switching sheet item)
14. Switching Operator removes all earths on section to be energised (switching sheet item)
15. The 11kV Live Line lead connection is made to the commissioned network (switching sheet item)
16. Remove DNOB close EDO's (switching sheet item)
17. Post-energisation checks/tests are to be completed(as per form 1175) (switching sheet item)
18. Phasing completed (switching sheet item)
19. Remove DNOB close LV switch/fuses (switching sheet item)
20. The new pole transformer and associated equipment is energised
21. Switching Operator completes switching
22. Network Operations update records

A.10 Construct and Commission a new Single Customer Pole Transformer

LIVE
HV



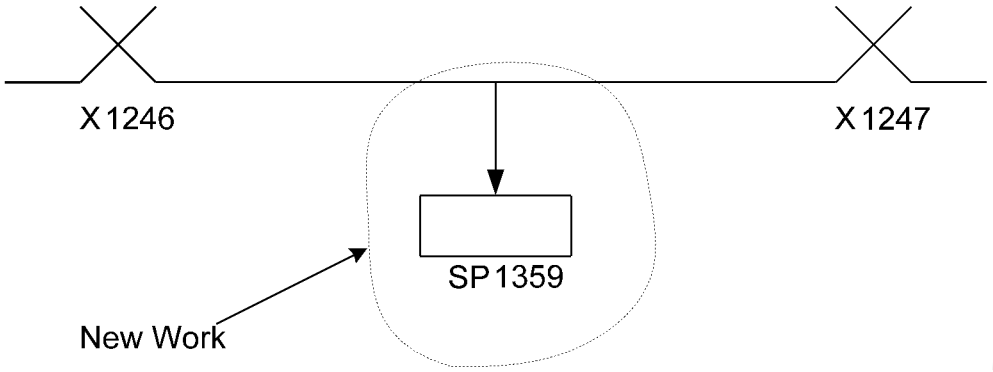
Work Group	Task
Overhead	Erect pole transformer SP5678 and associated equipment on existing pole. SP5678 remains Not Electrically Connected until day of commissioning
Network Operations	Forward and Reverse switching Update records

Typical Procedure

1. SP5678 is constructed and remains Not Electrically Connected from the commissioned network until it is required to be commissioned (Refer to Table 11.1 for disconnection methods)
2. Applicant submits switching application to Network Operations
3. Network Operations arrange switching sheet preparation and authorisation
4. Day of commissioning, workgroup checks SP5678 is Not Electrically Connected before commencement of any work
5. Workgroup apply portable earths (section 11.8.3)
6. Switching Operator obtains approval to commence switching
7. Check LV customers service disconnected from LV fuses (switching sheet item).
8. Check EDOs open place DNOB and LV fuses in open position and place DNOB (switching sheet item).

9. Issue W/A to work group to carry out next 2 items
10. Live Line leads installed to the top of the EDOs by workgroup (Do not connect to Live HV OHM's)
11. If applicable LV leads or bridges installed, including neutral conductor.
12. Revoke W/A from work group
13. Switching Coordinator confirms all pre-energisation checks/test completed (switching sheet item), (Checks/tests completed as per form 1175).
14. Receive authority from on-site supervisor – that the new pole transformer and associated equipment may be energised (switching sheet item)
15. Switching Operator removes all earths on section to be energised (switching sheet item)
16. The 11kV Live Line lead connection is made to the commissioned network (switching sheet item)
17. Remove DNOB close EDO's (switching sheet item)
18. Post-energisation checks/tests are to be completed(as per form 1175) (switching sheet item)
19. Phase Rotation completed (switching sheet item)
20. If applicable remove DNOB leave open (switching sheet item)
21. Switching Operator completes switching
22. Network Operations update records

A.11 Erect and Commissioning a Pole Transformer (11kV Isolation required)

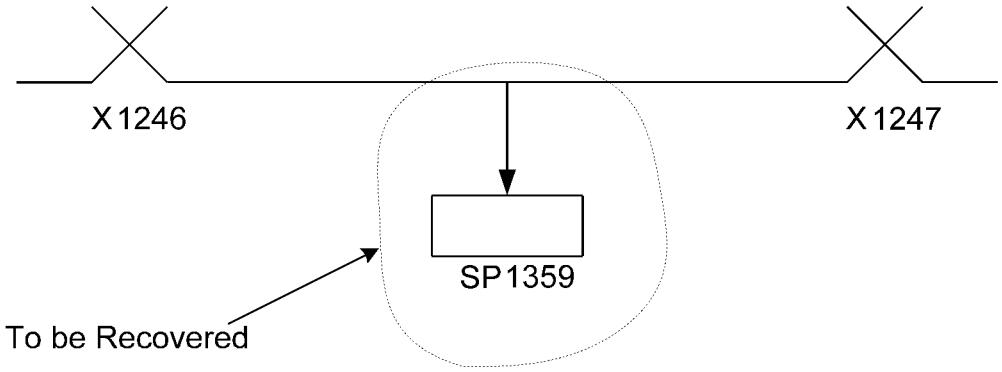


Work Group	Task
Overhead	Erect pole transformer SP1359 and associated equipment on existing pole
Network Operations	Forward and Reverse switching Update records

Typical Procedure

1. Applicant submits switching application to Network Operations
2. Network Operations arrange switching sheet preparation and authorisation
3. Switching Operator carries out forward switching
4. Isolation points shall include the X1246 and X1247and the New SP1359 LV switch
5. Switching Operator issues AP1 to Overhead
6. Overhead complete work including pre-energisation checks/tests and surrender AP1
7. Switching Operator recovers AP1
8. Receive authority from on-site supervisor – that the new pole transformer and associated equipment may be energised (switching sheet item)
9. Switching Coordinator confirms all pre-energisation checks/tests completed on AP, TP, AE (switching sheet item)
10. Switching Operator completes switching
11. Energise the new pole transformer and associated equipment
12. Post energisation checks/tests are to be completed
13. Network Operations update records

A.12 Decommissioning a Pole Transformer using an AP



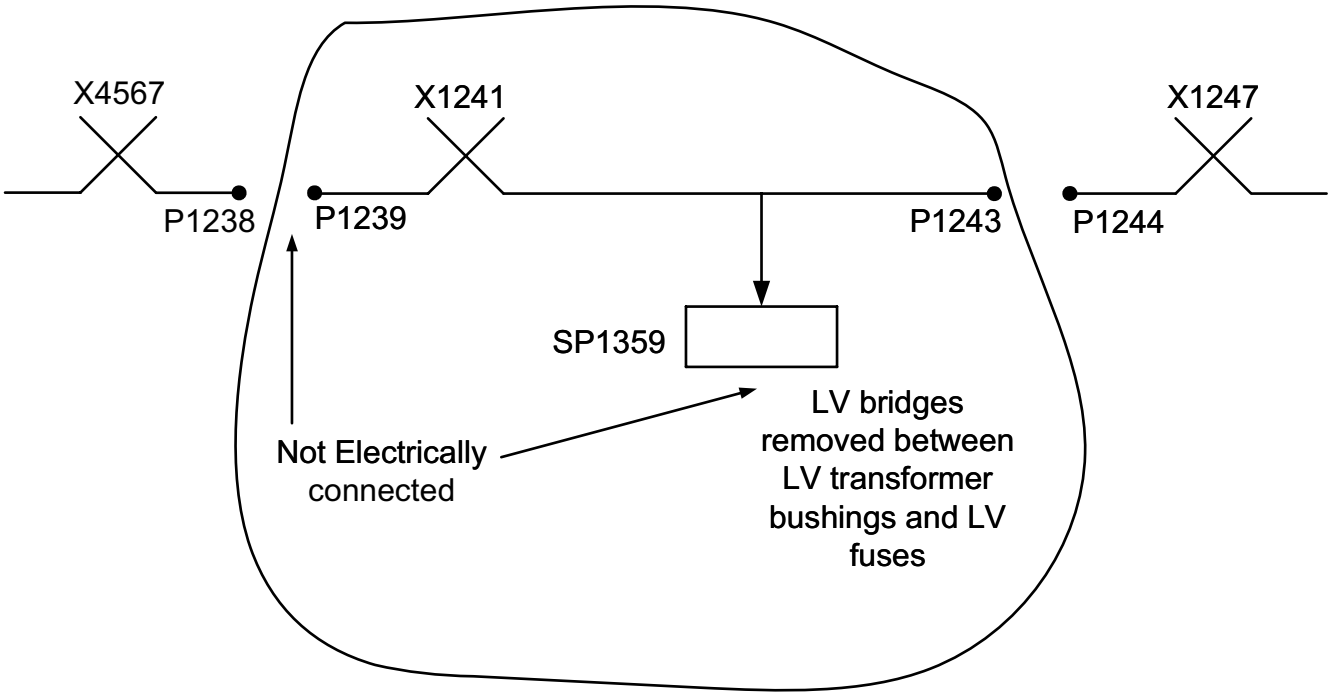
Work Group	Task
Overhead	Carry out switching to isolate SP1359 at that pole. Recover SP1359 and associated apparatus (work must be performed outside the exclusion zone).
Network Operations	Forward and Reverse switching Update records

Typical Procedure

1. Applicant submits switching application to Network Operations
2. Network Operations arrange switching sheet preparation and authorisation
3. Switching Operator carries out forward switching to de-energise and isolate[7] SP1359
4. Isolation points shall include SP1359 live line clamps and SP1359 LV switch
5. Switching Operator issues AP1 to Overhead
6. SP1359 and associated electrical apparatus has been disconnected per Table 11.1 and will now be recovered
7. The Recipient verbally requests from the Switching Coordinator to remove the operator earths, DNOBs from LV switch and live line clamps at SP1359
8. Overhead complete work and surrender AP1
9. Switching Operator recovers AP1
10. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
11. Switching Operator commences switching
12. Switching Operator checks SP1359 and associated electrical apparatus recovered (switching sheet items)
13. Network Operations update records

[7] using an approved isolation method

A.13 Decommissioning a Pole Transformer and ABS using a Decommissioning Notice



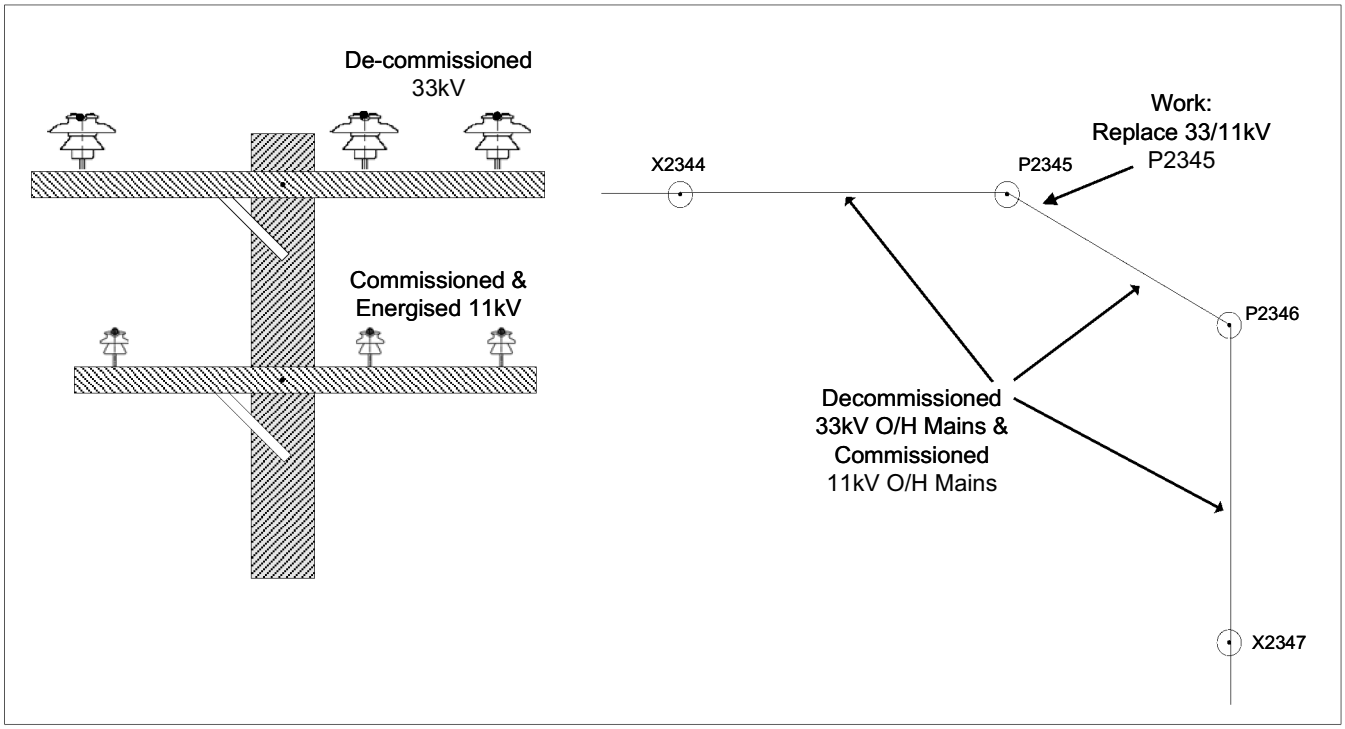
Work Group	Task
Overhead	Carry out switching to isolate SP1359 and X1241. Recover O/H mains and Bridges
Network Operations	Forward and Reverse switching Update records

Typical Procedure

1. Commissioning Coordinator submits switching application and Decommission Notice to Network Operations
2. Network Operations arrange switching sheet preparation and authorisation
3. Switching Operator carries out forward switching to de-energise and isolate SP1359 and X1241
4. Isolation points shall include X4567, X1247 and SP1359 LV switch
5. Switching Operator issues AP1 to Overhead
6. Overhead recover mains between P1238 to P1239, P1243 to P1244 and LV bridges removed between LV transformer bushings and LV fuses
7. Overhead completes work and surrenders AP1
8. Switching Operator recovers AP1
9. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
10. Switching Operator commences switching
11. Switching Operator checks electrical apparatus is disconnected as per Decommissioning Notice
12. Switching Coordinator issues Decommissioning Notice to Commissioning Coordinator
13. Switching Operator completes switching
14. Network Operations update records

A.14 Working on Commissioned and Decommissioned apparatus at the same time

Example: Replace 33/11kV P2345.



Work Group	Task
Overhead	Check Disconnection Methods per Decommissioning Notice Carry out switching to isolate X2344 and X2347. To replace P2345
Network Operations	Forward and Reverse switching

(The Recipient and On Site Supervisor should be the same person for this example)

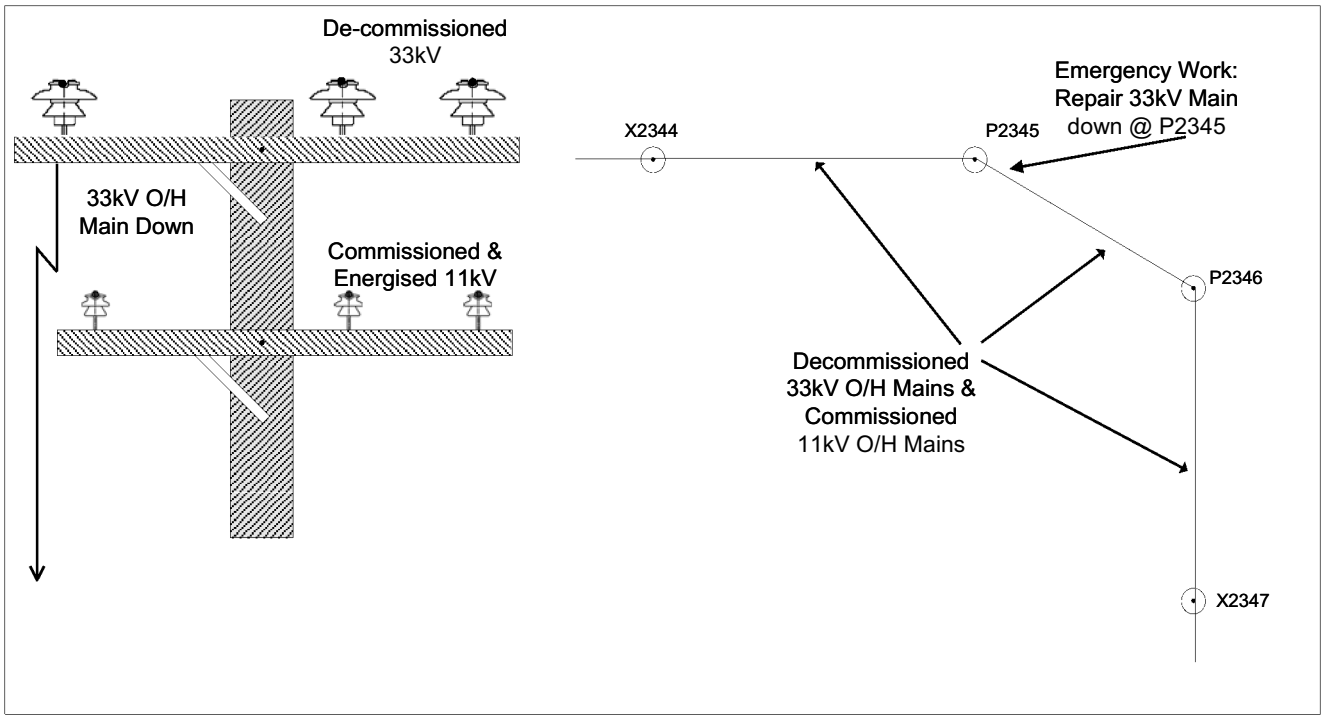
Typical Procedure

1. A Commissioning Coordinator provides a copy of Decommissioned Notice for the 33kV O/H mains to the Switching Coordinator and a copy to the On site Supervisor, in charge of the overhead work crew
2. Network Operations arrange switching sheet preparation and authorisation
3. The Commissioning Coordinator ensures the Not Electrically Connected 33kV O/H mains are disconnected per Decommissioning Notice
4. The Commissioning Coordinator ensures where applicable, that Not Electrically Connected electrical apparatus is suitably earthed and other precautions are in place prior to the issue of Decommissioning Notice Attachment A
5. The Commissioning Coordinator attaches the Decommissioning Notice and Attachment A form together, and issues Attachment A form to the On Site Supervisor for work on the decommissioned 33kV O/H mains
6. Switching Operator carries out 11kV forward switching
7. Switching Operator isolates and earths the commissioned 11kV O/H mains

8. Isolation points for the commissioned 11kV O/H mains shall include X2344 and X2347
9. Items of switching to confirm the On site Supervisor has checked disconnection points as per Decommissioning Notice
10. Items of switching to confirm the On site Supervisor has received a copy of the Decommissioning Notice and Attachment A
11. Operator issues AP1 to Overhead for the commissioned 11kV O/H mains at the work area
12. Recipient receives AP1
13. On Site Supervisor receives the Decommissioning Notice Attachment A
14. Under the direction of the On Site Supervisor the O/H work crew tests and earths the 33kV O/H and places any other precautions required for the work to be carried out.
15. Earths and other precautions are recorded on the Decommissioning Notice and Decommissioning Notice Attachment A Form
16. Overhead complete works
17. 33kV earths and other precautions are removed and recorded on the Decommissioning Notice and Attachment A Form
18. On Site Supervisor Surrenders the Decommissioning Notice Attachment A
19. AP1 is surrendered
20. Switching Operator recovers AP1
21. Switching Coordinator confirms all pre-energisation checks/test completed
22. Switching Operator checks all earths placed by work group are removed as per Decommissioning Notice and AP1
23. Switching Operator checks all other precautions are removed
24. Switching Operator completes 11kV reverse switching

A.15 Emergency Work on De-commissioned Electrical Apparatus with Commissioned Electrical Apparatus Below.

Example: Repair 33kV Main down at P2345



Work Group	Task
Overhead	Check Disconnection Methods per Decommissioning Notice Carry out switching to isolate X2344 and X2347. To replace P2345
Network Operations	Forward and Reverse switching

(The Recipient and On Site Supervisor should be the same person for this example)

Typical Procedure

1. A Commissioning Coordinator provides a copy of Decommissioned Notice for the 33kV O/H mains to the Switching Coordinator and a copy to the On site Supervisor, in charge of the overhead work crew
2. Network Operations arrange switching sheet preparation and authorisation
3. The Commissioning Coordinator ensures the Not Electrically Connected 33kV O/H mains are disconnected per Decommissioning Notice
4. The Commissioning Coordinator ensures where applicable, that Not Electrically Connected electrical apparatus is suitably earthed and other precautions are in place prior to the issue of Decommissioning Notice Attachment A
5. The Commissioning Coordinator attaches the Decommissioning Notice and Attachment A form together, and issues Attachment A form to the On Site Supervisor for work on the decommissioned 33kV O/H mains
6. Switching Operator carries out 11kV forward switching

7. Switching Operator isolates and earths the commissioned 11kV O/H mains
8. Isolation points for the commissioned 11kV O/H mains shall include X2344 and X2347
9. Items of switching to confirm the On site Supervisor has checked disconnection points as per Decommissioning Notice
10. Items of switching to confirm the On site Supervisor has received a copy of the Decommissioning Notice and Attachment A
11. Operator issues AP1 to Overhead for the commissioned 11kV O/H mains at the work area
12. Recipient receives AP1
13. On Site Supervisor receives the Decommissioning Notice Attachment A
14. O/H work crew tests and earths the 33kV O/H and places any other precautions required for the work to be carried out.
15. Earths and other precautions are recorded on the Decommissioning Notice and Attachment A Form
16. Overhead complete works
17. 33kV earths and other precautions are removed and recorded on the Decommissioning Notice and Attachment A Form
18. On Site Supervisor Surrenders the Decommissioning Notice Attachment A
19. AP1 is surrendered
20. Switching Operator recovers AP1
21. Switching Coordinator confirms all pre-energisation checks/test completed
22. Switching Operator checks all earths placed by work group are removed as per Decommissioning Notice and AP1
23. Switching Operator checks all other precautions are removed
24. Switching Operator completes 11kV reverse switching

A.16 Not Electrically Connected Electrical Apparatus to be Only Partially Recommissioned

Fig A16.1

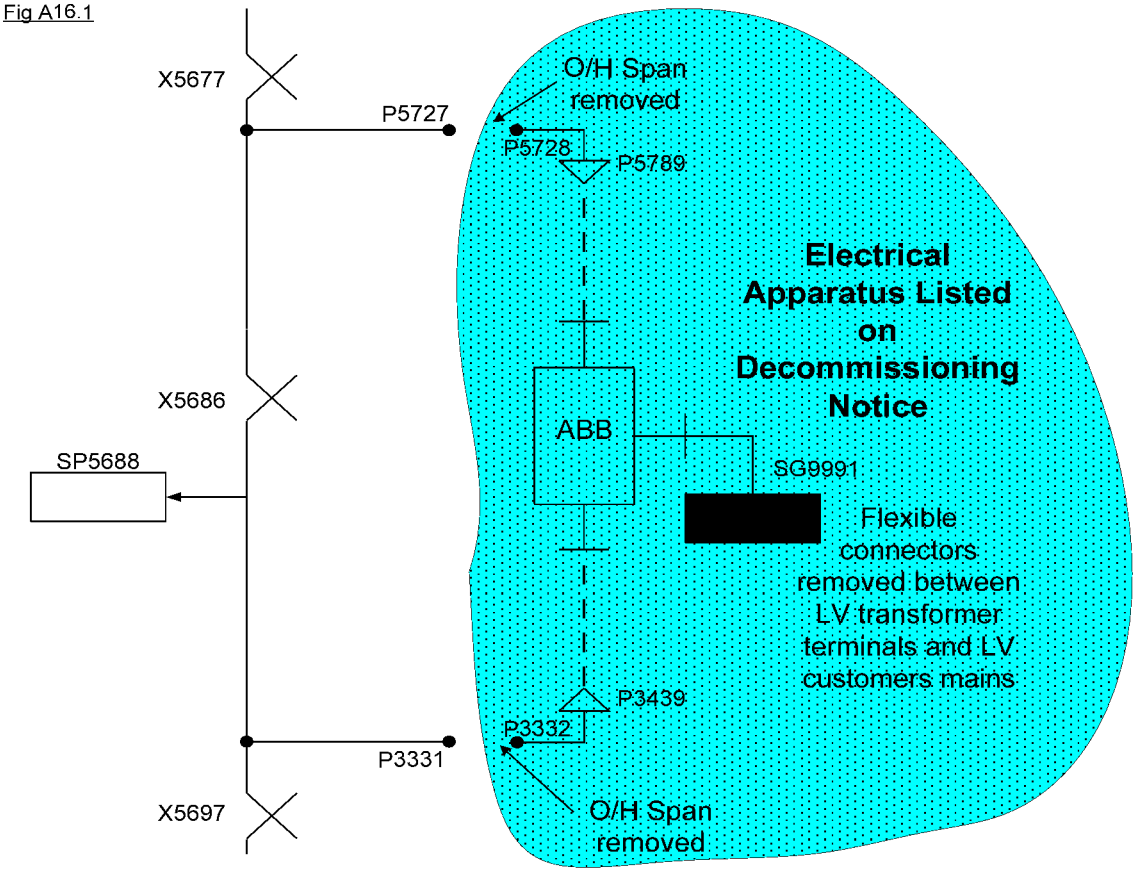
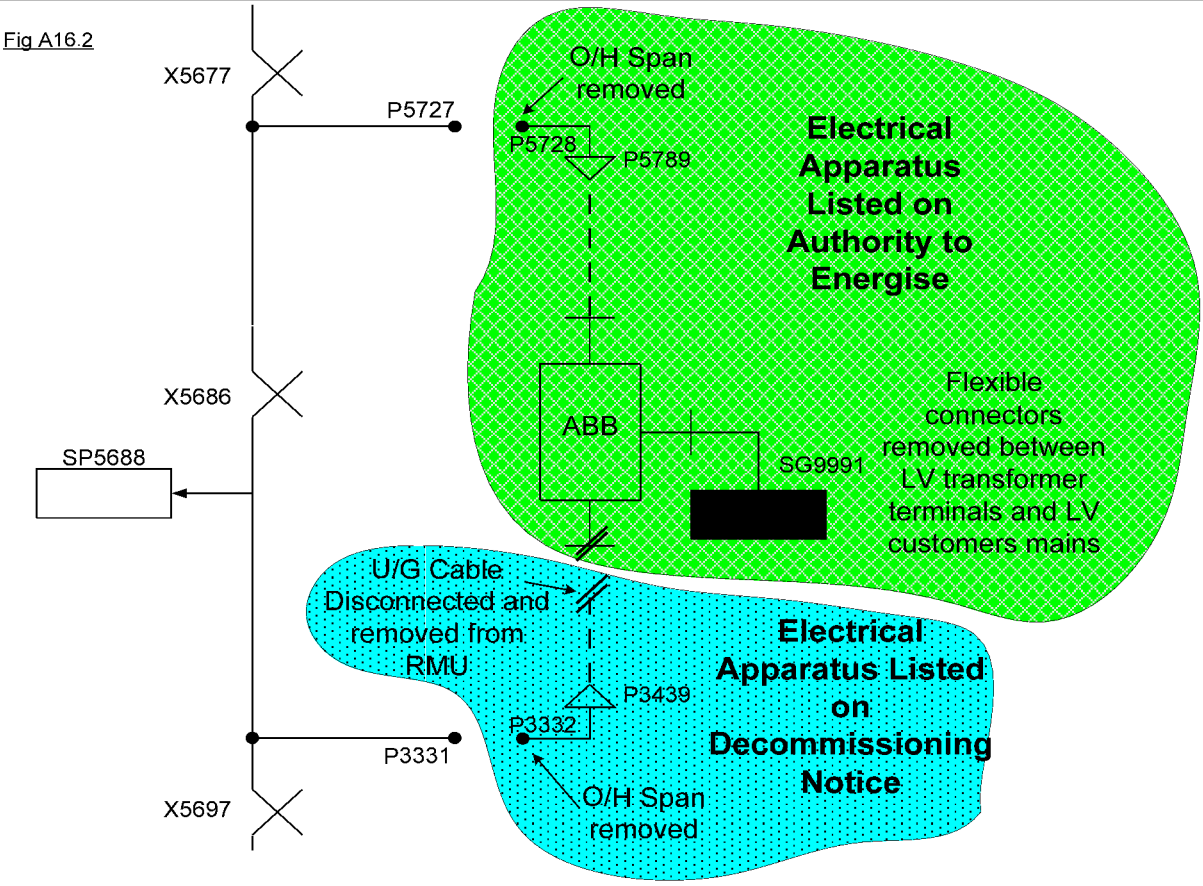


Fig A16.2



A.16:- Not Electrically Connected electrical apparatus to be only partially recommissioned.

Work Group	Task
Commissioning Coordinator in Fig A16.1	Decommissioning Notice required to display the Not Electrically Connected Electrical Apparatus that will remain disconnected on site
Commissioning Coordinator in Fig A16.2	Destroy the original Decommissioning Notice Prepare a new Decommissioning Notice to reflect Changes Follow Commissioning Procedures in Section 11.4.3.1, Commissioning Using an Authority to Energise

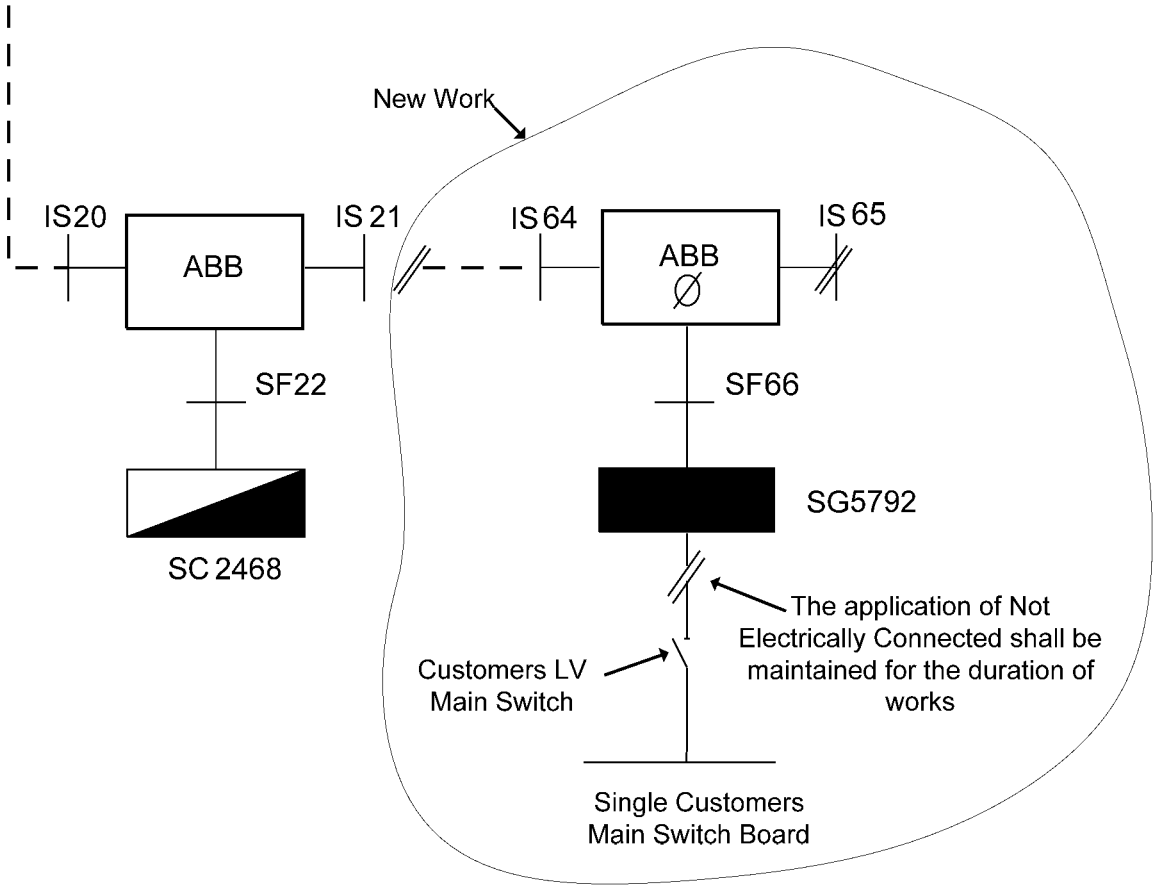
Typical Procedure
Fig A16.1

1. A Commissioning Coordinator should place where practical a copy of Decommissioned Notice on or near the Not Electrically Connected Electrical Apparatus
2. More than one copy of the Decommissioning Notice may be required when several locations are involved

Partial Recommissioning Fig A16.2

1. Destroy the original Decommissioning Notice
2. Prepare a new Decommissioning Notice/s to reflect the changed isolation for the part/s to remain Not Electrically Connected,
3. A Commissioning Coordinator shall issue and endorse that new Decommissioning Notice
4. A Switching Coordinator is not required to approve the authorisation of that Decommissioning Notice
5. Commissioning using an Authority to Energise method shall be used for the Not Electrically Connected electrical apparatus sections to be recommissioned, (Refer to 11.4.3.1)

A.17 Commissioning a New Single Customer SG Site (using an AE)



Work Group	Task
W/Group	**Install SG5792**
Underground	**Install and terminate new U/G cable.**
Contractors	**LV Works**
Field Test	**HV Cable Test**
Network Operations	**Forward & Reverse switching**

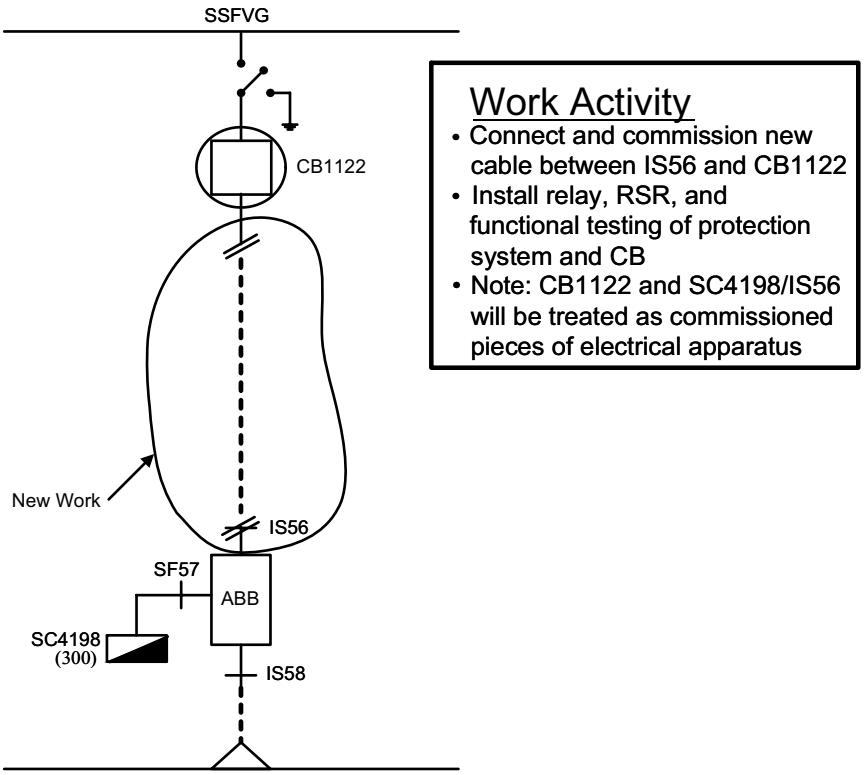
Typical Procedure

1. Commissioning Coordinator submits switching application
2. Network Operations arrange switching sheet preparation & authorisation
3. W/Group installs SG site[8]
4. Commissioning Coordinator issues CA1 to Underground to install and terminate U/G cable on IS64 and U/G cable between the RMU and transformer at SG5792.
5. Commissioning Coordinator issues CA2 to Contractors for LV works.
6. Commissioning Coordinator recovers CA1, CA2
7. Switching Operator carries out forward switching

[8] A CA is not required for this type of civil work

8. Isolation points shall include the SC2468/IS21, SG5792 Customers LV Main Switch and SG5792/IS65 Check Open and Place DNOB
9. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
10. Switching Operator issues AP1 to Workgroup to terminate U/G cable on IS21 at SC2468 and complete LV works.
11. Works completed and AP1 surrendered
12. .Switching Operator recovers AP1
13. Switching Operator issues TP2 to *Field Test*
14. Field Test complete HV cable tests
15. Switching Operator recovers TP2
16. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for SG5792 and associated U/G cable.
17. Network Operations receive AE from Commissioning Coordinator
18. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
19. Switching Operator checks the position of HV, including IS65 at SG5792 is secured in the open position, a system lock with DNOB tag placed
20. Switching Operator carries out reverse switching to energise new SG site
21. Post-energisation checks completed (as per form 1175)
22. Network Operations update records

A.18 Connecting a new 11kV U/G feeder cable to existing Spare CB



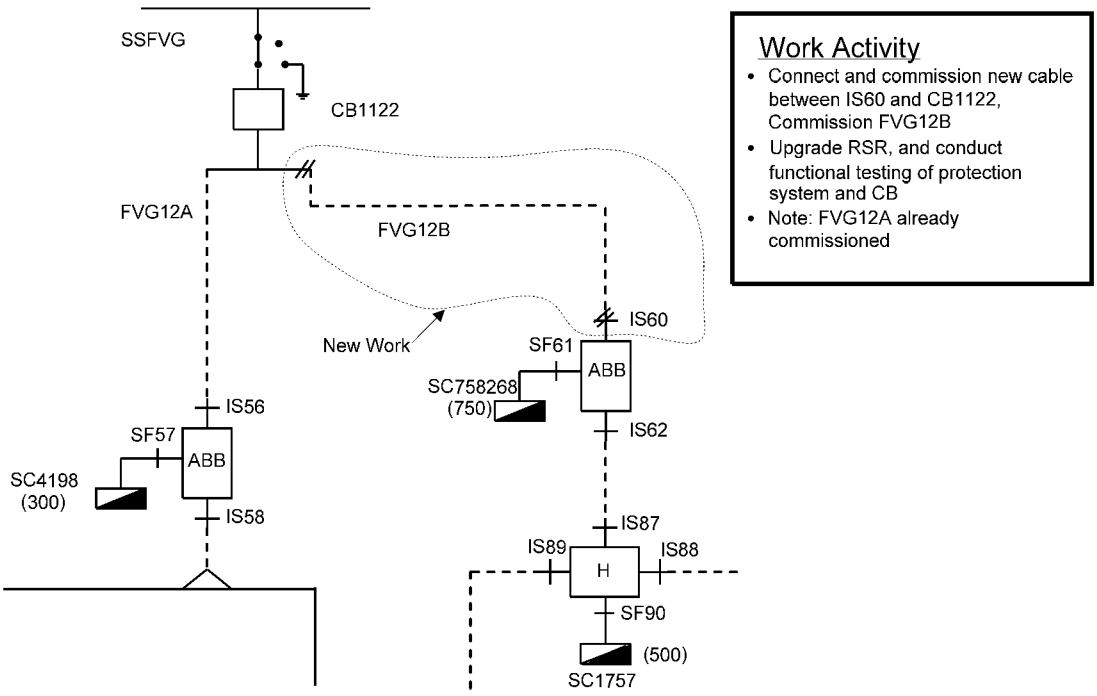
Work Group	Task
Network Operations	Forward and Reverse Switching
Substation Services	Commissioning Coordinator for CB1122
Underground	Install and terminate new U/G cable
Field Test	SSWP, TIS, PAS – testing protection
Protection Department	RSR
Field Test	HV Cable test

Typical Procedure

1. Substation Services appoint a Commissioning Coordinator
2. Commissioning Coordinator submits switching application
3. Network Operations arrange switching sheet preparation & authorisation
4. Substation Services carry out any wiring mods (Not involving cutting in) to the circuitry at SSFVG CB1122. (Note: No testing of the CB is required in this instance)
5. Commissioning Coordinator confirms Protection Department have issued the latest RSR
6. Commissioning Coordinator applies for switching for Field Tests to conduct functional testing of protection system. This may require a SSWP
7. Underground installs new U/G cable
8. Switching Operator carries out forward switching
9. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)

10. Switching Operator issues AP1 to Underground to connect new cable between SC4198/IS56 and CB1122 at SSFVG
11. Underground complete work and surrender AP1
12. Switching Operator recovers AP1
13. Switching Operator issues TP2 to Field Test
14. Field Test complete HV cable tests
15. Switching Operator recovers TP2
16. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for CB1122 and Underground Cable
17. Network Operations receive AE from commissioning coordinator
18. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
19. Switching Operator carries out reverse switching (energising new CB1122 and U/G cable)
20. Network Operations update records

A.19 Commission 11kV feeder FVG12B – between CB1122 and IS60



Work Group	Task
Network Operations	Forward and Reverse Switching
Substation Services	Commissioning Coordinator for CB1122
Underground	Install and terminate new U/G cable
Field Test	SSWP, TIS, PAS – testing protection
Protection Department	RSR
Field Test	HV Cable test

Typical Procedure

1. Substation Services appoint a Commissioning Coordinator
2. Commissioning Coordinator submits switching application
3. Network Operations arrange switching sheet preparation & authorisation
4. Substation Services carry out any wiring mods (Not involving cutting in) to the circuitry at SSFVG CB1122. (Note: No testing of the CB is required in this instance)
5. Commissioning Coordinator confirms Protection Department have issued the latest RSR
6. Commissioning Coordinator applies for switching for Field Tests to conduct functional testing of protection system. This may require a SSWP
7. Underground installs new U/G cable
8. Switching Operator carries out forward switching
9. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
10. Switching Operator issues AP1 to Underground to connect new cable between SC758268/IS60 and CB1122 at SSFVG
11. Underground complete work and surrender AP1

12. Switching Operator recovers AP1
13. Switching Operator issues TP2 to Field Test
14. Field Test complete HV cable tests
15. Switching Operator recovers TP2
16. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for CB1122 and Underground Cable
17. Network Operations receive AE from commissioning coordinator
18. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
19. Switching Operator carries out reverse switching (energising new U/G cable between CB1122 and SC758268/IS60)
20. Network Operations update records

A.20 Commissioning new substation including transformers and 11kV switchboard – no 11kV feeders connected.

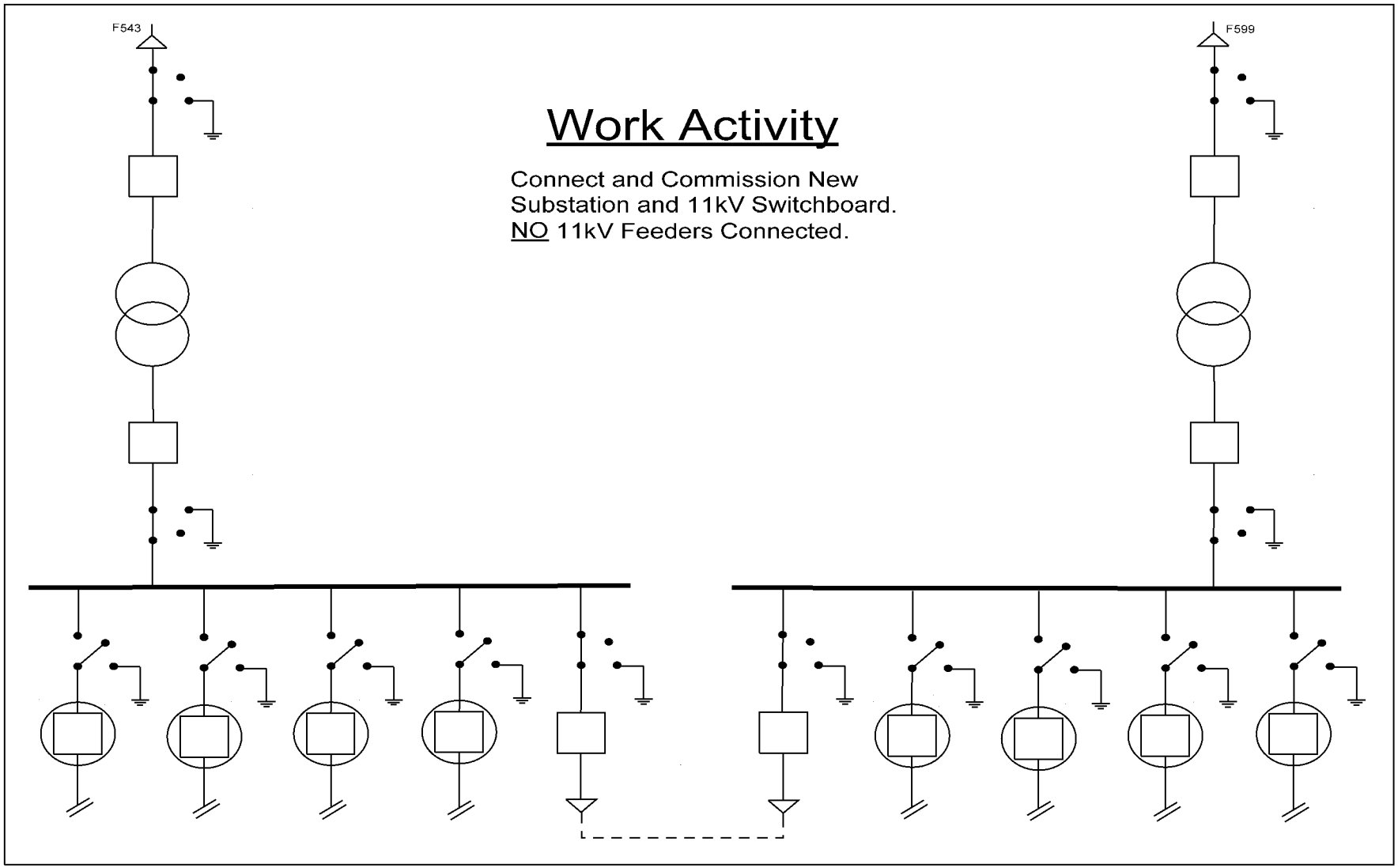
Work Group	Tasks
	Tasks involved using Commissioning Procedures
Substation Services	Commissioning Coordinator for New Substation
Underground	CA -install and terminate new HV U/G cables within substation
Substation Services	CA - installation of all substation equipment and apparatus
Field Test	TA – testing protection and secondary system wiring
Protection Department	RSRs
Field Test	TA - HV Cable tests
SCADA	Installation of hardware and software for SACS
Communications	Comms installation
Meter Services	
Contractors	CA - installation of all substation equipment and apparatus
	Tasks involved using SAHV Procedures
Network Operations	Forward and Reverse Switching
Substation Services	Commissioning Coordinator confirm T/As recovered before the issue of APs
Underground	Connect substation to existing network
Field Test	HV Cable tests
Field Test	Post commissioning tests

Typical Procedure

1. Substation Services appoint a Commissioning Coordinator
2. Commissioning Coordinator submits switching applications and a commissioning program
3. Network Operations arrange switching sheet preparation & authorisation
4. Commissioning Coordinator issues CAs to all workgroups involved to construct substation
5. Underground installs new U/G cables and makes connection to selected new circuit breakers/transformers
6. Commissioning Coordinator confirms Protection Department have issued all RSRs for new Sub
7. Commissioning Coordinator issues CA to Field Test to conduct testing of all substation electrical equipment
8. Commissioning Coordinator recovers all CAs to issue TA for Field Tests to conduct functional testing of protection system (lethal current)
9. Switching Operator carries out forward switching
10. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
11. Switching Operator issues AP1 for Underground to cut into existing cable in two places (e.g. F567)
12. Underground cuts into existing cable (e.g. F567) and surrenders AP1
13. Switching Operator recovers AP1

14. Switching Operator carries out switching to include changed isolation points (& feeder number changes e.g. F599 and F543)
15. Switching Operator issues AP2 (F599) and AP3 (F543) for Underground to joint new cables.
16. Underground complete work and surrender AP2 and AP3
17. Switching Operator recovers AP2 and AP3
18. Switching Operator issues TP4 and TP5 to Field Test
19. Field Test complete HV cable tests
20. Switching Operator recovers TP4 and TP5
21. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for new substation and 33kV underground cables
22. Network Operations receive AE from commissioning coordinator
23. Switching Coordinator confirms all pre-energisation checks/test completed on APs, TPs, AEs (switching sheet item)
24. Switching Operator carries out reverse switching (energising new 33kV feeders and substation)
25. Field Test carry out any post commissioning checks and tests for new substation
26. Network Operations update records

A.20: Commissioning new substation including transformers and 11kV switchboard – no 11kV feeders connected.



A.21 Commission 11kV switchboard via two 11kV feeders – transformers and 33kV switchgear to be energised in the future

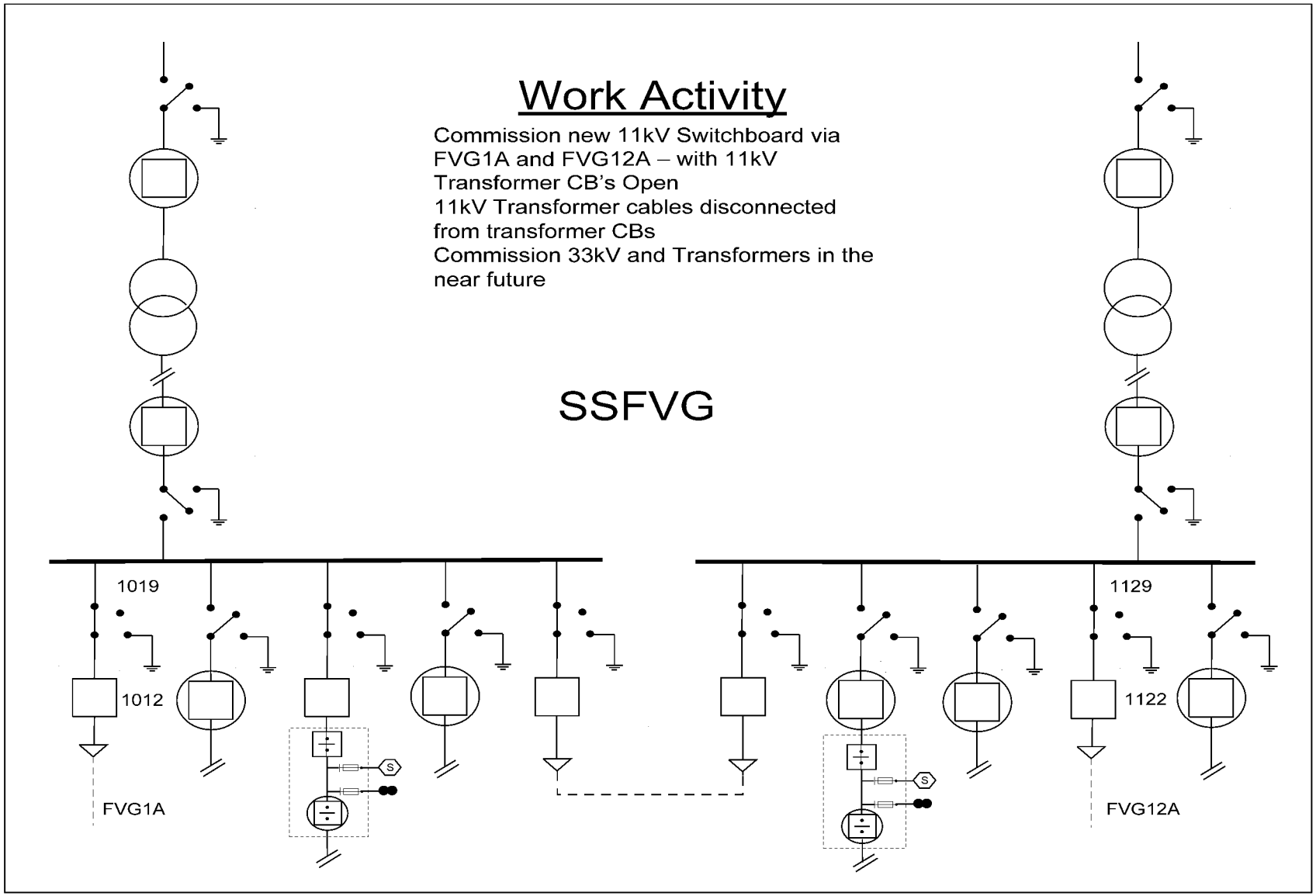
Work Group	Tasks
	Tasks involved using Commissioning Procedures
Substation Services	Commissioning Coordinator for New Substation
Underground	CA -install and terminate new HV U/G cables within substation
Substation Services	CA - installation of all substation equipment and apparatus
Field Test	TA – testing protection and secondary system wiring
Protection Department	RSRs
Field Test	TA - HV Cable tests
SCADA	Installation of hardware and software for SACS
Communications	Comms installation
Meter Services	
Contractors	CA - installation of all substation equipment and apparatus
	Tasks involved using SAHV Procedures
Network Operations	Forward and Reverse Switching
Substation Services	Switching Operator Commissioning Coordinator confirm T/As recovered before the issue of APs
Underground	Connect substation to existing via the 11kV network
Field Test	HV Cable tests
Field Test	Post commissioning tests

Typical Procedure

1. Substation Services appoint a Commissioning Coordinator
2. Commissioning Coordinator submits switching applications and a commissioning program
3. Network Operations arrange switching sheet preparation & authorisation
4. Commissioning Coordinator issues CAs to all workgroups involved to construct substation
5. Underground installs new U/G cables and makes connection to selected new 11kV circuit breakers
6. Commissioning Coordinator confirms Protection Department have issued all RSRs for new Sub
7. Commissioning Coordinator issues CA to Field Test to conduct testing of all substation electrical equipment
8. Commissioning Coordinator recovers all CAs to issue TA for Field Tests to conduct functional testing of protection system (lethal current)
9. Switching Operator carries out forward switching
10. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
11. Switching Operator issues AP1 and AP2 for Underground to cut into existing network for feeders FVG1A and FVG12A
12. Underground completes work and surrenders AP1 and AP2
13. Switching Operator recovers AP1and AP2

14. Switching Operator issues TP3 and TP4 to Field Test
15. Field Test complete HV cable tests
16. Switching Operator recovers TP3 and TP4
17. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for new 11kV bus and 11kV underground cables
18. Network Operations receive AE from commissioning coordinator
19. Switching Coordinator confirms all pre-energisation checks/test completed on APs, TPs, AEs (switching sheet item)
20. Switching Operator carries out reverse switching (energising new 11kV feeders and 11kV bus)
21. Field Test carry out any post commissioning checks and tests for new 11kV bus if required
22. Network Operations update records

A.21: Commission 11kV switchboard via two 11kV feeders – transformers and 33kV switchgear to be energised in the future



A.22 Commissioning ½ new substation including one transformer and ½ 11kV switchboard – One 11kV feeder connected.

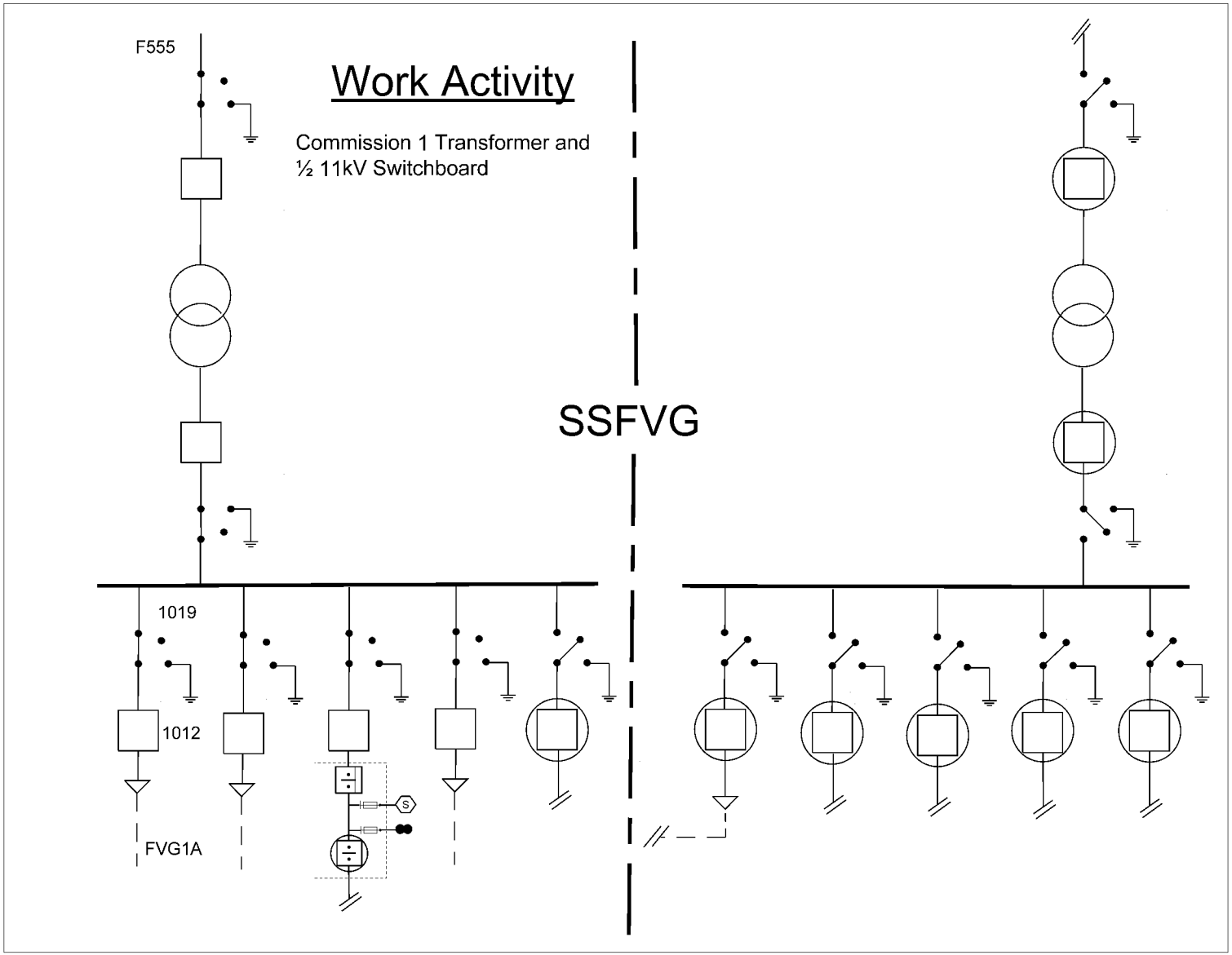
Work Group	Tasks
	Tasks involved using Commissioning Procedures
Substation Services	Commissioning Coordinator for New Substation
Underground	CA -install and terminate new HV U/G cables within substation
Substation Services	CA - installation of all substation equipment and apparatus
Field Test	TA – testing protection and secondary system wiring
Protection Department	RSRs
Field Test	TA - HV Cable tests
SCADA	Installation of hardware and software for SACS
Communications	Comms installation
Meter Services	
Contractors	CA - installation of all substation equipment and apparatus
	Tasks involved using SAHV Procedures
Network Operations	Forward and Reverse Switching
Substation Services	Commissioning Coordinator confirm T/As recovered before the issue of APs
Underground	Connect substation to existing network
Field Test	HV Cable tests
Field Test	Post commissioning tests

Typical Procedure

1. Substation Services appoint a Commissioning Coordinator
2. Commissioning Coordinator submits switching applications and a commissioning program
3. Network Operations arrange switching sheet preparation & authorisation
4. Commissioning Coordinator issues CAs to all workgroups involved to construct substation
5. Underground installs new U/G cables and makes connection to selected new 11kV circuit breaker
6. Commissioning Coordinator confirms Protection Department have issued all RSRs for new Sub
7. Commissioning Coordinator issues CA to Field Test to conduct testing of all substation electrical equipment
8. Commissioning Coordinator recovers all CAs to issue TA for Field Tests to conduct functional testing of protection system (lethal current)
9. Switching Operator carries out forward switching
10. Switching Operator confirms with Commissioning Coordinator that all CAs/TAs are recovered (switching sheet item)
11. Switching Operator issues AP1 and AP2 for Underground to cut into existing network for feeders F555 and FVG1A
12. Underground completes work and surrenders AP1 and AP2
13. Switching Operator recovers AP1 and AP2
14. Switching Operator issues TP3 and TP4 to Field Test

15. Field Test complete HV cable tests
16. Switching Operator recovers TP3 and TP4
17. Commissioning Coordinator confirms all pre-energisation checks/test complete, then authorises AE for new 11kV bus and 11kV underground cables
18. Network Operations receive AE from commissioning coordinator
19. Switching Coordinator confirms all pre-energisation checks/test completed on AP, TP, AE (switching sheet item)
20. Switching Operator carries out switching to energise new 33kV feeder and substation
21. Field Test carry out any post commissioning checks and tests for new substation
22. Switching Operator carries out switching to energise new 11kV bus and new 11kV feeder
23. Field Test carry out any post commissioning checks and tests for new 11kV bus if required
24. Network Operations update records

A22: Commissioning ½ new substation including one transformer and ½ 11kV switchboard –One 11kV feeder connected



A.23 Forms

Switching Application

No. AS1043006

To Area:	South Coast TMR 220, Ph 07 3407 5295;	Highest Voltage:	11kV
Applicant Name:	ARRON SMITH		
Telephone Number:	3426 1633	Received:	18/08/2009
Fax Number:	3426 1632	Job Start:	Friday 20/11/2009 07:00
Service Provider:	South Coast DS	Job End:	Friday 20/11/2009 17:00

1 Access / Test Permits / Work Authority Required / LV Switching Sheet Authorisation

Location	Lines and Apparatus	A/P T/P W/A LV	Work Group	From Day	From Time	From Date	To Day	To Time	To Date
Trial St Southport	11kV Mains	A/P	Southport U/G	Friday	08:00	20/11/2009	Friday	15:00	20/11/2009
Trial St Southport	11kV Mains	T/P	Cable Test	Friday	15:00	20/11/2009	Friday	16:00	20/11/2009

2 Work Details/Description

Bridge in and commission new 11kV U/G cable, ABB RMU and transformer SC2468

Work Location	Trial St Southport				
SUBS	SPO	FDRS	SPO3	Panel	SPO/B
Grid Ref.	D-4				
HV System Alteration Required	Yes			EMERG. Rest. Time (B/hrs)	2
(A/hrs)	0				
W/Plan No:	C001234			Contingency Required?	No
Phasing Required	No	Where			
Phase Rotation Required	Yes	Where	LV Switch SC2468		

3 Isolation Points

X1234 (Trial St Southport)

X5678 (Trial St Southport)

SC2468/IS21 (Trial St Southport)

LV Switch @ SC2468/DL1 (Trial St Southport)

Will LV tie(s) be isolation point for HV Access ?	No
LV switching points checked in the field?	Yes

4 HV Operator Earths

P10123 (Trial St Southport)

SC2468/IS21 (Trial St Southport)

5 Secondary System Details

Secondary Systems Required ? No

Protection Permit Required? No

Location	Number	Protection Isolated	Location	Number	Protection Isolated

Switching Application

No. AS1043006

6 Commissioning / Decommissioning Details

"AE" Required?	Yes	Commission Coordinator:	Arron Smith
"DN" Required ?	No		

Commissioning Transformer	Yes	Commissioning RMU	Yes
Single Customer Transformer	No	Commissioning FU	No
Generator Connection Suitability	Yes	If yes, RMU/FU/RDU Brand Name	SAFELINK
LV Mains to be Energised	No	Is unit fitted with phasing facilities?	Yes

7 Customer Outage

No. of Customers Interrupted 0

	Outage 1	Outage 2	Outage 3	Outage 4
Supply Off				
Supply On				
Notification Date				
Notification Method				
Notification By				
Suburb/Area				
Streets (incl no's)				
Network Affected				
Priority Consumers				
Location/Phone				
Details				
Arrangements				
Arranged By				

8 LV Details

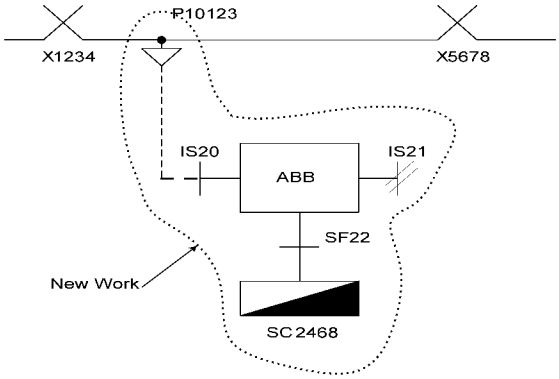
LV areas to be tied in?	No	Alternator Required?	No
Are LV ties in database?	No	Size:	
		Alt Connection Point:	
LV Switching Sheet Attached?	No	Parallel	No
		Isolated	No

9 Additional Remarks

No LV connected to LV switchboard @ SC2468

Switching Application

No. «AppNumber»



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No.

Construction Authority

1	**Project/Works Order Number**	
2	**Authority to Energise Number**	
3	**Work Area Location**	
4	**Anticipated Surrender**	Time : Day Date / /
5	**Issue To**	

6 Detailed description of not electrically connected electrical apparatus to be constructed / worked on.

Install SC2468 padmount and RMU. Install and terminate 11kV underground Cable between P10123 and IS20 at RMU SC2468 Howard St

7 Method of Disconnection of not electrically connected electrical apparatus from the commissioned network

1. No 11kV bridges between Underground Termination and existing 11kV O/H mains @ P10123
2. No LV cables connected at LV switchboard @ SC2468
3. No 11kV Underground Cable connected to IS21 @ SC2468

8 Earths On Electrical Apparatus

	Exact Location	Placed/Checked By Signature, Time and Date	Removed By Signature, Time and Date
a	**11kV Switch IS20 @ SC2468**	Graham Hill	
		10:00 08/12/2009	/ /
b	**11kV Switch SF22 @ SC2468**	Graham Hill	
		10:05 08/12/2009	/ /
c	**11kV U/G Termination @ P10123 Howard St**	Allan Jones	
		12:05 09/12/2009	/ /

9 Other Precautions Taken

☐ Taping/Roping Off ☐ Work Area Sign ☐ Live HV Lines & Apparatus Above or beyond Board

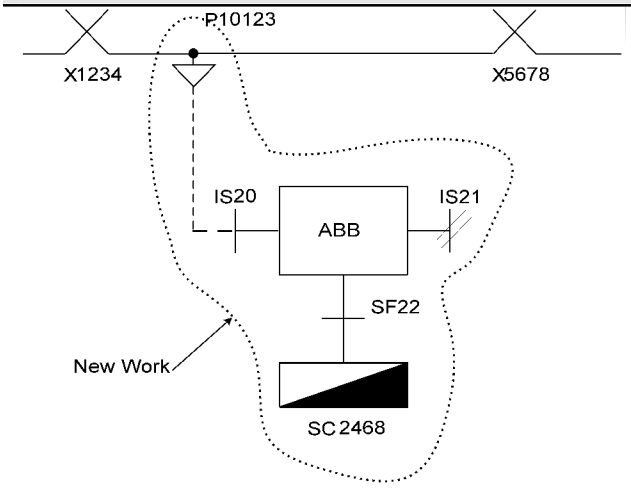
☐ Barriers in Place

☐ Other (please specify)

10 Nearby Live HV/LV at the Work Area

Existing 11kV Overhead Mains at P10123 Howard St

11 Diagrams / Remarks



12 Issue of Construction Authority

The electrical apparatus detailed on the front of this Construction Authority will not be energised whilst this form is on issue

	Name (please print)	Signature	Time	Date
Commissioning Co-ordinator				/ /

13 Receipt of Construction Authority

I acknowledge that I only have authority to work on the electrical apparatus listed in section 6 and will have no difficulty in keeping clear of electrical apparatus not covered by this Authority and will not alter disconnection methods listed in section 7

	Name (please print)	Signature	Time	Date
On-Site Supervisor				/ /

14 Transfer of Construction Authority

This Construction Authority with all conditions is hereby transferred

	Name (please print)	Signature	Time	Date
Outgoing On-Site Supervisor				/ /
Incoming On-Site Supervisor				/ /

15 Abnormalities

NIL

16 Surrender of Construction Authority

This Authority is now surrendered, subject to any abnormalities listed in Section 15. All persons for whom I am responsible are clear and have been instructed to treat electrical apparatus listed on Page 1 as live. The condition of earthing is as stated in Section 8

All required pre-energisation checks/tests for electrical apparatus listed on Page 1 have been successfully completed (Tick 3 one box only)	☒ **Yes**	☐ **No**	If "NO", record the checks/tests that were successfully completed under this Authority in Section 15 Abnormalities

	Name (please print)	Signature	Time	Date
On-Site Supervisor				/ /

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Test Authority

No. 778899 - 2

1.	**Project/Works Order Number**	C00678944		
2.	**Authority to Energise Number**	778899		
3.	**Work Area Location**	Howard St Mt Gravatt		
4.	**Anticipated Surrender**	Time 14 : 30	Day Thursday	Date 10/12/2009
12	**Issue To**	Cable Test		

6. Detailed description of not electrically connected electrical apparatus for testing work.

Test new 11kV underground Cable between P10123 and IS20 at SC2468

Howard St

7. Methods of Disconnection of not electrically connected electrical apparatus from the commissioned network

1. No 11kV bridges between Underground Termination and existing 11kV O/H mains @ P10123
2. No LV cables connected at LV switchboard @ SC2468
3. No 11kV Underground Cable connected to IS21 @ SC2468

8. Earths On Electrical Apparatus

	Exact Location	Placed / Checked By Signature, Time and Date	Removed / Checked By Signature, Time and Date
A	**11kV Switch IS20 @ SC2468**	Graham Hill	
		10:00 08/12/2009	: / /
B	**11kV Switch SF22 @ SC2468**	Graham Hill	
		10:05 08/12/2009	: / /
C	**11kV U/G Termination @ P10123 Howard St**	Allan Jones	Jackie Stewart
		12:05 09/12/2009	14:25 10/12/2009

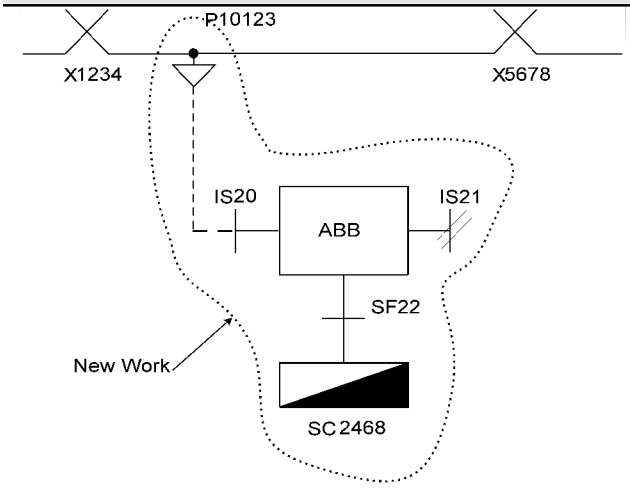
9. Other Precautions Taken

- ☑ Taping / Roping Off
- ☐ Work Area Sign
- ☐ Live HV Lines & Apparatus Above or beyond Board
- ☐ Barriers in Place
- ☑ HV Testing Board
- ☐ Other (please specify)

10. Nearby Live HV/LV at the Work Area

Existing 11kV Overhead Mains at P10123 Howard St

11. Diagrams / Remarks



12. Delegation to Issue

The following delegate may issue this Authority on my behalf, provided the following CA's are recovered -

CA No.	Workgroup	Issued
		/ /
		/ /
		/ /

Delegates Name (please print)

	Name (please print)	Signature	Time	Date
Commissioning Coordinator				/ /

13. Issue of Test Authority

I have recovered all Construction Authorities "CA's" on issue (as per the AE or as stated in Section 12 above) for the electrical apparatus detailed on the front of this Test Authority and the electrical apparatus will not be commissioned whilst this form is on issue

	Name (please print)	Signature	Time	Date
Commissioning Coordinator or Delegate	Graham Hill	Graham Hill	13:30	10/12/2009

14. Receipt of Test Authority

I acknowledge that I only have authority to carry out testing work on the electrical apparatus listed on the front of this form and will have no difficulty in keeping clear of electrical apparatus not covered by this Authority and will not alter disconnection methods listed in section 7. Earths may be varied under my direction to suit testing

	Name (please print)	Signature	Time	Date
On-Site Test Supervisor	Jackie Stewart	Jackie Stewart	13:30	10/12/2009

15. Test Results

The electrical Apparatus detailed on the front of this authority has -

	Details
☑ Passed Test	11kV U/G cable passed test
☐ Failed Test	

16. Surrender of Test Authority

This Authority is now surrendered and Test Results recorded in Section 15. All persons for whom I am responsible are clear and have been instructed to treat the electrical apparatus covered by this Authority as live. The condition of earthing is as stated in Section 8

	Name (please print)	Signature	Time	Date
On-Site Test Supervisor	Jackie Stewart	Jackie Stewart	15:00	10/12/2009

HV Access Permit

Permit No.	1

1. Switching Sheet No.	G1231231	2. Nominated Issue	*Time*	08:00
			Date	01/06/2010
3. Issue To	Soutport Underground	4. Nominated Surrender	*Time*	15:00
			Date	01/06/2010
5. Work Area Location	Trial St Southport			

6. Access to the following High Voltage Electrical Apparatus

11kV Overhead Mains at P10123

7. Work Details

Erect and terminate 11kV U/G cable at P10123. Bridge in and commission new 11kV U/G cable for new SC2468

8(a). Description of Isolation Points with DNOBs attached (including alpha identifiers)

X1234 (Trial St Southport)

X5678 (Trial St Southport)

SC2468/IS21 (Trial St Southport)

LV Switch @ SC2468/DL1 (Trial St Southport)

8(b). Description of Disconnection Points (If applicable)

9. Location of Operator Earths with DNOBs attached (including alpha identifiers)

11kV O/H mains @ P10123 (Trial St Southport)

SC2468/IS21 (Trial St Southport)

10. Other Precautions

☐ Live HV Conductors Above or Beyond Sign ☐ HV Testing Sign ☐ Work Area Sign

☐ Other (please specify below) – ☐ Additional Barriers in Place ☐ Roping Off ☒ Not Applicable

11. Nearby Exposed Live HV/LV at the Work Area

☒ HV Not Applicable

☒ LV Not Applicable

12. Issue of HV Access Permit

	Name (please print)	Signature	Time	Date
Approval by (Switching Coordinator)	Mark Weber			
Issued by Switching / Operator / Coordinator	Jenson Button	Jenson Button	07:50	01/06/2010

13. Receipt of HV Access Permit

I acknowledge that I only have access to the Electrical Apparatus listed in Section 6 and Shall have no difficulty in keeping clear of Electrical Apparatus not covered by this Permit and Shall not alter Isolation Points. Earths and Other Precautions can be altered as per Qld Electricity Entity Procedures for Safe Access to HV Electrical Apparatus. Any testing performed under this HV Access Permit shall not involve Lethal Current.

	Name (please print)	Signature	Time	Date
Recipient	Lewis Hamilton	Lewis Hamilton	07:55	01/06/2010

HV Access Permit

Permit NO.	1

14. Work Group Signatures

Sign On				Sign Off		
I acknowledge that I only have access to the Electrical Apparatus listed in Section 6 of this HV Access Permit while Earthed and I shall have no difficulty in keeping clear of Electrical Apparatus not covered by this HV Access Permit and shall not alter Isolation Points. I acknowledge that only Authorised Individuals of Work Group Shall vary Earths or Other Precautions as directed by the Recipient.				*I acknowledge that I no longer have access to the Electrical Apparatus listed in Section 6 of this HV Access Permit and shall regard the Electrical Apparatus as being Live.*		
Name (please print)	**Signature**	**Time**	**Date**	**Signature**	**Time**	**Date**
			/ /			/ /
			/ /			/ /
			/ /			/ /
			/ /			/ /
			/ /			/ /
			/ /			/ /
			/ /			/ /
			/ /			/ /
			/ /			/ /

15. Transfer of HV Access Permit

This HV Access Permit, with all conditions, is hereby transferred –

	Name (please print)	**Signature**	**Time**	**Date**
Outgoing Recipient				/ /
Incoming Recipient				/ /

16. Suspend / Reinstate HV Access Permit

This HV Access Permit, with all conditions, is hereby suspended / reinstated –

	Name (please print)	**Signature**	**Time**	**Date**
Suspended by Recipient				/ /
Reinstated by Recipient				/ /

17. Working Earth Schedule

Item	Location of each set of Working Earths	On		Off	
		Time	**Date**	**Time**	**Date**
1.			/ /		/ /
2.			/ /		/ /
3.			/ /		/ /
4.			/ /		/ /
5.			/ /		/ /
6.			/ /		/ /

18. Operator Earth Schedule (for temporary removal of Operator Earths)

Item	Location of each set of Operator Earths	Off		On	
		Time	**Date**	**Time**	**Date**
1.			/ /		/ /
2.			/ /		/ /
3.			/ /		/ /
4.			/ /		/ /
5.			/ /		/ /
6.			/ /		/ /

19. Abnormalities (the Switching Coordinator shall be advised of these)

Cable Test Required

Are Supplementary Page(s) on issue for this permit? (select one box only) ☐ Yes. *If yes, Number of Pages:* _____ ☒ No

20. Surrender of HV Access Permit

All required pre-energisation checks/tests have been successfully completed (select one box only) ☒ **Yes** ☐ **No** If "NO", record the checks/tests not successfully completed under this Permit in Section 19 'Abnormalities'

All Working Earths placed have been removed and Operator Earths replaced except as specified in Section 19 'Abnormalities' and I acknowledge that I no longer have access to the Electrical Apparatus listed in Section 6 and Shall regard the Electrical Apparatus as being Live.

	Name (please print)	**Signature**	**Time**	**Date**
Recipient	Lewis Hamilton	Lewis Hamilton	14:00	01/06/2010

HV Test Permit

Permit NO.	2

1. Switching Sheet No.	G1231231	**2. Nominated Issue**	*Time*	15:00
			Date	01/06/2010
3. Issue To	Cable Test	**4. Nominated Surrender**	*Time*	16:00
			Date	01/06/2010
5. Work Area Location	Trial St Southport			

6. Access to the following High Voltage Electrical Apparatus

11kV Underground Cable between SC2468/IS20 and P10123

7. Test Details

Conduct Cable test on 11kV Underground between SC2468/IS20 and P10123

8(a). Description of Isolation Points with DNOBs attached (including alpha identifiers)

X1234 (Trial St Southport)

X5678 (Trial St Southport)

SC2468/IS21 (Trial St Southport)

LV Switch @ SC2468/DL1 (Trial St Southport)

8(b). Description of Disconnection Points: (If applicable)

9. Location of Operator Earths with DNOBs attached (including alpha identifiers)

11kV O/H mains @ P10123 (Trial St Southport)

SC2468/IS21 (Trial St Southport)

10. Other Precautions

☐ Live HV Conductors Above or Beyond Sign ☒ HV Testing Sign ☐ Work Area Sign

☐ Other (please specify below) ☐ Additional Barriers in Place ☒ Roping Off ☐ Not Applicable

11. Nearby Exposed Live HV/LV at the Work Area

☒ HV Not Applicable

☒ LV Not Applicable

12. Issue of HV Test Permit

	Name (please print)	**Signature**	**Time**	**Date**
Approval by (Switching Coordinator)	Mark Weber			
Issued by Switching / Operator / Coordinator	Jenson Button	Jenson Button	14:30	01/06/2010

13. Receipt of HV Test Permit

I acknowledge that I only have access to the Electrical Apparatus listed in Section 6 and Shall have no difficulty in keeping clear of Electrical Apparatus not covered by this Permit and Shall not alter Isolation Points. Earths and Other Precautions can be altered as per Qld Electricity Entity Procedures for Safe Access to HV Electrical Apparatus.

	Name (please print)	**Signature**	**Time**	**Date**
Recipient	Jackie Stewart	Jackie Stewart	14:35	01/06/2010

HV Test Permit

Permit NO.	2

14. Work Group Signatures

Sign On				Sign Off		
I acknowledge that I only have access to the Electrical Apparatus listed in Section 6 of this HV Test Permit while Earthed and I shall have no difficulty in keeping clear of Electrical Apparatus not covered by this HV Test Permit and shall not alter Isolation Points. I acknowledge only Authorised Individuals of Work Group Shall vary Earths or Other Precautions as directed by the Recipient.				*I acknowledge that I no longer have access to the Electrical Apparatus listed in Section 6 of this HV Test Permit and shall regard the Electrical Apparatus as being Live.*		
Name (please print)	**Signature**	**Time**	**Date**	**Signature**	**Time**	**Date**
			/ /			/ /
			/ /			/ /
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			/ /			/ /
			/ /			/ /

15. Transfer of HV Test Permit

This HV Test Permit, with all conditions, is hereby transferred –

	Name (please print)	**Signature**	**Time**	**Date**
Outgoing Recipient				/ /
Incoming Recipient				/ /

16. Working Earth Schedule

Item	**Location of each set of Working Earths**	**On**		**Off**	
		Time	**Date**	**Time**	**Date**
1.			/ /		/ /
2.			/ /		/ /
3.			/ /		/ /
4.			/ /		/ /
5.			/ /		/ /
6.			/ /		/ /

17. Operator Earth Schedule (for temporary removal of Operator Earths)

Item	**Location of each set of Operator Earths**	**Off**		**On**	
		Time	**Date**	**Time**	**Date**
1.			/ /		/ /
2.			/ /		/ /
3.			/ /		/ /
4.			/ /		/ /
5.			/ /		/ /
6.			/ /		/ /

18. Abnormalities (the Switching Coordinator shall be advised of these)

NIL

Are Supplementary Page(s) on issue for this permit? (select one box only) ☐ Yes. *If yes, Number of Pages:* _____ ☒ No

19. Surrender of HV Test Permit

All required pre-energisation checks/tests have been successfully completed (select one box only)	☒ **Yes**	☐ **No**	If "NO", record the checks/tests not successfully completed under this Permit in Section 18 'Abnormalities'

All Working Earths placed have been removed and Operator Earths replaced except as specified in Section 18 'Abnormalities' and I acknowledge that I no longer have access to the Electrical Apparatus listed in Section 6 and Shall regard the Electrical Apparatus as being Live.

	Name (please print)	**Signature**	**Time**	**Date**
Recipient	Jackie Stewart	Jackie Stewart	16:05	01/06/2010

No.

Authority to Energise

1	**Commissioning Coordinator**
2	**Project / Works Order No.**
3	**Location / Area**
4	**Project Description**

Commission New ABB RMU and 300kVA padmount transformer SC2468 Howard St

Commission new 11kV cable and between P10123 and SC2468/IS20

5 Detailed description of electrical apparatus to be energised

1. New 11kV ABB safelink RMU @ SC2468
2. New 300kVA padmount type transformer @ SC2468
3. New 11kV U/G cable and between P10123 and SC2468/IS20

6 CA's (Construction Authorities) on Issue

CA No.	Work Group	On-Site Supervisor	Remarks	Issued	Recovered
	Overhead			/ /	/ /
	Underground			/ /	/ /
	Substations			/ /	/ /
	Substation Tests			/ /	/ /
	Customer Service			/ /	/ /
	Contractors			/ /	/ /
	Meter Services			/ /	/ /
				/ /	/ /
				/ /	/ /

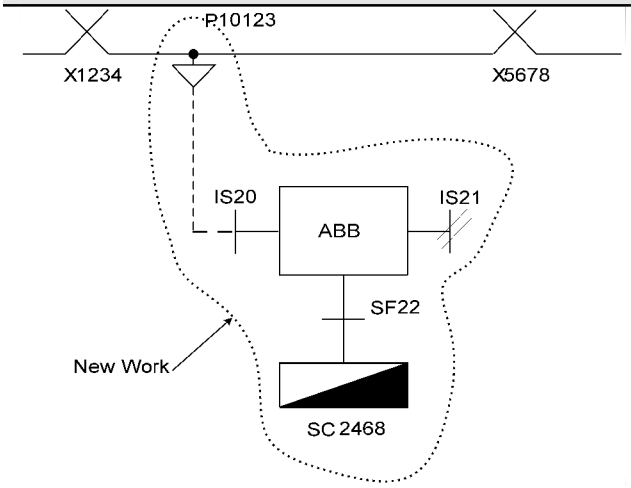
7 TA's (Test Authorities) on Issue

TA No.	Test Group	On-Site Supervisor	Remarks	Issued	Recovered
	Substations			/ /	/ /
	Substation Tests			/ /	/ /
	Cable Tests			/ /	/ /
				/ /	/ /
				/ /	/ /

8 Earths not removed from electrical apparatus

	Exact Location	Removed By		
		Signature	Date	Time
a	**11kV Switch IS20 @ SC2468**	Jenson Button	10/12/2009	15:20
b	**11kV Switch SF22 @ SC2468**	Jenson Button	10/12/2009	15:20
c			/ /	:
d			/ /	:

9 Diagrams / Remarks



10 Delegation to Authorise

The following person may authorise this authority on my behalf (responsibility remains with the Commissioning Coordinator)

Delegate's Name (please print)	**Commissioning Coordinator Signature**	**Time**	**Date**
			/ /

11 Abnormalities

11kV Switch SF22 @ SC2468 left in earth position, refer to section 8 above

11kV Switch IS20 @ SC2468 left in earth position, refer to section 8 above

12 Authorisation

Electrical apparatus listed in section 5 may now be energised, subject to any abnormalities or checks/tests listed in Section 11. All required pre-energisation checks/tests are completed (unless stated in Section 11) and all persons involved in this project are clear and have been instructed to treat the electrical apparatus as live. The condition of earthing is as stated in Section 8.

	Name (please print)	**Signature**	**Time**	**Date**
Commissioning Coordinator / Delegate				/ /

Reference AS No. 700023

DeCommissioning Notice

1	**Commissioning Co-ordinator**	Name (please print) Ayrton Senna
2	**Project / Works Order No.**	110kV F999 and SSWMR / C005556831
3	**Work Area Location**	Bray Creek Rd Marburg, Cotton Tree HWY Brightbiew, Scotts Rd Mt Walker

4 Detailed description of electrical apparatus to be de-commissioned

Decommission 33kV O/H mains between P777884 Bray Creek Rd Marburg P8997 Cotton Tree HWY and P11134 Scotts Rd Mt Walker.

(Decommission Feeder F333)

5 Earths on de-commissioned electrical apparatus

	Exact Location	Placed / Checked by Signature / Time / Date	Removed by Signature / Time / Date
a	33kV O/H Mains @ P77884 Bray Creek Rd Marburg	Tony Marsh	
		14:40 17/02/2009	/ /
b	33kV O/H Mains @ P2345 Scott Rd Mt Walker	Dave Scott	Dave Scott
		08:30 07/12/2009	15:45 07/12/2009
C			
		/ /	/ /

6 Method of disconnection

The above electrical apparatus have been disconnected from the commissioned network using the following methods

1. 33kV O/H Landing Span recovered between 33kV bus @ SSMMM and P77884 Bray Creek Rd Marburg
2. 33kV O/H Mains recovered between P8998 and P8997 (One span) Cotton Tree HWY Brightview
3. 33kV O/H Mains recovered between P2346 and P11134 (Three span) Scotts Rd Mt Walker

7 Authorisation

The above electrical apparatus is disconnected, by an approved method, from all sources of supply. No switching to re-energise the electrical apparatus will be approved until an Authority to Energise (AE) Form covering the electrical apparatus is received from a Commissioning Co-ordinator

	Name (please print)	Operations Centre / Signature	Time	Date
Switching Coordinator	Harry Merkel	ENERGEX Net OPPS	14:40	17/02/2009
Switching Operator	Tony Marsh	Tony Marsh	14:40	17/02/2009

Notice - Attachment A

Reference AS No 700023 -1

The following sections apply to work on Not Electrically Connected Electrical Apparatus that will not be recommissioned in the foreseeable future

8 Conditions to work

a) Work shall only be carried out on Electrical Apparatus Listed in Section 4

b) The Electrical Apparatus has been disconnected from the commissioned network listed in Section 6

c) The Electrical Apparatus shall have all phases short-circuited and earthed while work is in progress. The placement and removal of earths shall be recorded in section 5

d) The Commissioning Coordinator is responsible for all work carried out under this Decommissioning Notice and ensure where applicable that the Electrical Apparatus listed in section 4 is suitably earthed and other precautions are in place prior to the issue of this Notice

e) The On-Site Supervisor is responsible for the Electrical Safety of the Workgroup under this Notice

9 Other Precautions Taken

☐ Taping/Roping Off ☐ Work Area Sign ☐ Live HV Lines & Apparatus Above Board

☐ Barriers in Place

☐ Other (please specify) NIL

10 Nearby Live HV/LV at the Work Area

NIL

11 Issue of Decommissioning Notice Attachment

The Electrical Apparatus detailed on the front of this Decommissioning Notice can be worked on whilst this form is on issue

	Name (please print)	Signature	Time	Date
Commissioning Coordinator	**Ayrton Senna**	**Ayrton Senna**	**08:00**	**07/12/2009**

12 Receipt of Decommissioning Notice Attachment

I acknowledge that I only I have authority to work on the Not Electrically Connected Electrical Apparatus listed in Section 4 and will have no difficulty in keeping clear of Electrical Apparatus not covered by this Decommissioning Notice and will not alter disconnection points listed in Section 6

	Name (please print)	Signature	Time	Date
On-Site Supervisor	**Clay Regazzoni**	**Clay Regazzoni**	**08:00**	**07/12/2009**

13 Abnormalities

NIL

14 Surrender of Decommissioning Notice Attachment

This Decommissioning Notice is now surrendered, subject to any abnormalities listed in Section 13. All persons for whom I am responsible are clear and have been instructed to remain clear of the Electrical Apparatus listed in Section 4. The condition of earthing is as stated in Section 5

	Name (please print)	Signature	Time	Date
On-Site Supervisor	**Clay Regazzoni**	**Clay Regazzoni**	**16:00**	**07/12/2009**

B Typical examples of HV Commissioning Plans

B.1 Typical Commissioning Plan for a Large Substation Project

Commissioning Plan Version 1 (3/07/2009)

Commission 33kV/11kV Substation @ SSCRB

Work Group	Role	Contact	Contact Number
Network Projects Delivery	Project Manager	Joe Fry	0409 056 003
Substation Services	Commissioning Coordinator for Substation works	Fred Gamble	0409 056 004
Major Works	Construction Manager	Jo Bartner	0409 056 005
Mains Services	33kV Feeder Commissioning Coordinator	Bill Moss	0409 056 006
Mains Services	33kV Feeder Construction	Jackie Steward	0409 056 007
Protection Systems	Field Test	Larry Perkins	0409 056 008
Condition Monitoring	Cable test	Dave Morgan	0409 056 009
SCADA Services	Network automation	Scott Speed	0409 056 010
Telecommunication Engineering	Communications	Jackie Oliver	0409 056 011

Project: C0001234567

SCOPE: Construct new 33kV switching station (future 110/33 bulk supply).Construct 33/11 zone substation and commission. Supply new Tugun desalination at 33kV.

Order of works

Stage 1
Install and commission new 33kV feeder F3755 from SSBHD, bypassing SSCRB initially for supply to MU2, TR2 at SSTUG. (Completed 2/7/2009)

Stage 2 (Wednesday 19th – Thursday 20th August 2009 commissioning)
Commission F3751, BB32, BB33, TR2, BB12, BB13, RM1, RM2, TR8, TR9
(CB3T51, CB3T52, CB3T61, CB3T62. Note: dummy plugged with no cables VT supplies for protection)

Works to be completed prior to Saturday 15th August 2009
U/G Transmission install and terminate F3751 into SSCRB.
U/G Transmission install and terminate11kV station transformer cables at SSCRB
U/G Transmission install and terminate TR2 33 and 11kV cables at SSCRB
U/G Transmission may choose to install TR3 33 and 11kV cables while on site.

Cable test to test F3751 cables. (Fault locations completed)
Cable test to test F3754 cables (completed)

Cable test (or Subs) to test TR2, TR8, TR9 cables
Substations to install Dummy plugs in future 33kV TR5 and TR6 CB orifices.

Communications to complete protection relay communication for BHD to CRB. (Completed)
Network automation to complete SACS installation SSCRB
Field test to complete testing on F3751
Electric fence energisation and alarms back to Vic Park Control.
Fire system commissioned and alarms to Vic Park.
Buildings to be sealed for Argonite system

Stage 3 F3754 (Tugun desal MU1 /TR1)
(Friday 21st August 2009 commissioning)

Works to be completed
U/G Transmission install and terminate F3754 into SSCRB
U/G Transmission to install MU1 to TR1 cables at SSTUG
Cable test to test F3754 (final test)
Field test to test F3754 protection.
Tugun desalination TR1 and Cables
Field test protection F3754 and TR1 SSTUG
Communications to have communication paths ready

Stage 4 F3755 and F3757
(Wednesday 26th August 2009)

Decommission F3755 and TR2 SSTUG. (Pending relay for TR1 @ TUG)
Cut and turn F3755 into SSCRB.
SSBHD to SSCRB to remain F3755
Commission F3755 pending cable test 4th September 2009)

Rename SSCRB to SSTUG F3757
Recommission F3755.
Recommission F3757 and TR2 SSTUG.
Commission F3755 pending cable test 9th September 2009)
Software build at SSBHD to delete SSTUG (F3755 and sub alarms)
Software build at SSCRB to show CRB to TUG final arrangement.

Stage 5
Works to be completed for future TR3
Transfer of all 11kV feeders (Mark Weber Southport distribution)
Decommission and transport CRP transformer.
Substations to wire new transformer.
Field test to retest Transformer
U/G Transmission install 11kV cables to TR3 at SSCRB
U/G Transmission install and terminate 33kV TR3 cables on structure at SSCRB
Cable test to test TR3, cables

After decommissioning SSCRP, then commission CB3931 and CB3932.

Chris Gamble
Substation Commissioning Supervisor

B.2 Typical Commissioning Plan for a City Area Project

C008545712121 – Split Three Feeder Radial Commissioning Plan

Work Group	Role	Contact	Contact Number
Network Projects Delivery	Project Manager	David Coulthard	0409 056 022
Substation Services	Commissioning Coordinator for Substation works and feeder Works	Luke Hamilton	0409 056 023
Field Services	11kV feeder Construction	Damon Hill	0409 056 024
Protection Systems	Field Test	Johnny Herbert	0409 056 026
Condition Monitoring	Cable test	Philippe Addams	0409 056 027

Stage One – AS _____
Split F1220 & TTF77
Cut R.M.U. Clear at SS BAC and Joint Feeder to SS CMC
(Note: Feeder Already Cut and Jointed At SS ATC)
1 x AE for 11kV Feeder 1220
Panel: ATC B (LHS)

Wednesday 19th – Thursday 20th August 2009 commissioning

Open LV Switch TR1 @ SS CSB
Note: SS CSB Customer to Close L.V. Bus Tie (1 x 1500kVA)
Open IS5336 @ SS CSB
Open LV CB TR1 @ SS WKS
Note: SS WKS Solid L.V. Bus (1 x 1000kVA)
Open IS5068 @ SS WKS
Open LV CB TR1 @ SS MIM
Note: SS MIM Customer to Close L.V. Bus Tie (1 x 1000kVA)
Open IS4679 @ SS MIM
Check Open IS5423 @ SS BAC
Open LV CB TR1 @ SS CMC
Note: SS CMC Solid L.V. Bus (1 x 1000kVA)
Open IS5338 @ SS CMC
Open LV CB TR1 @ SS CCB
Note: SS CCB Solid L.V. Bus (1 x 750kVA)
Open IS5149 @ SS CCB
Customer to open LV CB TR1 @ SS EHS
Note: SS EHS Customer to Close L.V. Bus Tie (1 x 1500kVA)
Open IS5242 @ SS EHS
Open LV CB TR1 @ SS ANZ

Note: SS ANZ Solid L.V. Bus (1 x 500kVA)
Open IS5334 @ SS ANZ

Open LV CB TR4 @ SS ANZ
Note: SS ANZ Solid L.V. Bus (1 x 500kVA)
Open IS5335 @ SS ANZ
Open LV CB TR1 @ SS CWO
Note: SS CWO Customer to Close L.V. Bus Tie (1 x 1500kVA)
Open IS4681 @ SS CWO
Trip CB2772 @ SS ATC
Check CB1220 Open @ SS ATC
Earth CB1220 Cable Orifice @ SS ATC
Earth IS5338 @ SS CMC

Earth IS5423 @ SS BAC
Issue AP#1 to Kelvin Grove Underground to ID & Spike in Pit 248 (F1220)
Issue AP#2 to Kelvin Grove Underground to ID & Spike in Pit 249 (F1220)
Issue WA#3 to City Substations for panel modifications @ SS ATC (CB2772 and CB1220)
Issue WA#4 to City Substations for Protection Cutovers @ TTF77 Remote End Substations
Decommission Part of Old F1220 (Including SS BAC R.M.U.)
DN1 – IS5423 at SS BAC to Pit 248 and to Pit 249
Issue AP#5 to Kelvin Grove Underground to Straight Joint in Pit 248 (F1220)
Issue AP#6 to Kelvin Grove Underground to Straight Joint in Pit 249 (F1220)
Revoke WA#3 and WA#4 to City Substations
Issue TP#7 to Cable Test (F1220 Cable Test)
Issue WA#8 to Field Test for functional testing @ SS ATC (CB2772 & CB1220)
Revoke WA#8 to Field Test

Sunday 23rd August 2009

Issue WA#9 to Field Test for functional testing @ SS ATC CB1220 And F1220 Remote End Substations
Issue WA#10 to Field Test for functional testing @ SS ATC CB2772 and TTF77 Remote End Substations
Revoke WA#9 and WA#10 to Field Test
Issue AE
Remove All Operator Earths
Close CB1220 @ SS ATC
Close IS5336 @ SS CSB
Close LV Switch TR1 @ SS CSB
Close IS5068 @ SS WKS

Close LV CB TR1 @ SS WKS
Close IS4679 @ SS MIM
Close LV CB TR1 @ SS MIM
Close IS5338 @ SS CMC
Phase Out Across LV CB TR1 @ SS CMC
Close LV CB TR1 @ SS CMC
Close CB2772 @ SS ATC
Close IS5149 @ SS CCB
Close LV CB TR1 @ SS CCB
Close IS5242 @ SS EHS
Make Customer LV CB TR1 Available @ SS EHS
Close IS5334 @ SS ANZ
Close LV CB TR1 @ SS ANZ
Close IS5335 @ SS ANZ
Close LV CB TR4 @ SS ANZ
Close IS4681 @ SS CWO
Close LV CB TR1 @ SS CWO

Stage Two – AS _____
Split F1221 – Into F1221 and TTF76
Cut F1221 Cable in SS ATC Cable Basement and Live End Seal
Joint Cut Cable from F1221 to Decommissioned Cable From CB2762 / ATC to create TTF76
Cut R.M.U. Clear at SS BAC and Joint Feeder to SS CMC
1 x AE for 11kV Feeder TTF76 (Note: CB2762 Requires H.V. Test)
1 x AE for 11kV Feeder 1221
Panel: ATC B (LHS)

Saturday 29th August 2009

Open LV Switch TR2 @ SS CSB
Note: SS CSB Customer to Close L.V. Bus Tie (1 x 1500kVA)
Open IS5308 @ SS CSB
Open LV CB TR2 @ SS WKS
Note: SS WKS Solid L.V. Bus (1 x 1000kVA)
Open IS5070 @ SS WKS
Open LV CB TR2 @ SS MIM
Note: SS MIM Customer to Close L.V. Bus Tie (1 x 1000kVA)
Open IS4723 @ SS MIM
Check Open IS5424 @ SS BAC
Open LV CB TR2 @ SS CMC
Note: SS CMC Solid L.V. Bus (1 x 1000kVA)
Open IS5376 @ SS CMC
Open LV CB TR2 @ SS CCB
Note: SS CCB Solid L.V. Bus (1 x 750kVA)
Open IS5155 @ SS CCB

Customer to open LV CB TR2 @ SS EHS
Note: SS EHS Customer to Close L.V. Bus Tie (1 x 1500kVA)
Open IS5245 @ SS EHS
Open LV CB TR2 @ SS ANZ
Note: SS ANZ Solid L.V. Bus (1 x 500kVA)

Open IS5374 @ SS ANZ
Open LV CB TR5 @ SS ANZ
Note: SS ANZ Solid L.V. Bus (1 x 500kVA)
Open IS5375 @ SS ANZ
Open LV CB TR2 @ SS CWO
Note: SS CWO Customer to Close L.V. Bus Tie – As Required (1 x 1500kVA)
Open IS4724 @ SS CWO
Trip CB1221 @ SS ATC
Earth CB1221 Cable Orifice @ SS ATC
Earth IS5308 @ SS CSB
Earth IS5155 @ SS CCB
Earth IS5376 @ SS CMC
Earth IS5424 @ SS BAC
Issue AP#1 to Kelvin Grove Underground to ID & Spike in SS ATC Cable Basement (F1221)
Issue AP#2 to Kelvin Grove Underground to ID & Spike in Pit 248 (F1221)
Issue AP#3 to Kelvin Grove Underground to ID & Spike in Pit 249 (F1221)
Issue WA#4 to City Substations for panel modifications @ SS ATC (CB2762 and CB1221)
Issue WA#5 to City Substations for Protection Cutovers @ TTF76 Remote End Substations

Carry Out Label Changes
Note: TTF76 Now Supplies
SS CCB / TR2
SS EHS / TR2
SS ANZ / TR2 / TR5
SS CWO / TR2
Decommission Part of Old F1221 (Including SS BAC R.M.U.)
DN1 – IS5424 at SS BAC to Pit 248 and to Pit 249
Issue AP#6 to Kelvin Grove Underground to Straight Joint in SS ATC Cable Basement (TTF76)
Issue AP#7 to Kelvin Grove Underground to Live End Seal in SS ATC Cable Basement (F1221)
Issue AP#8 to Kelvin Grove Underground to Straight Joint in Pit 248 (F1221)
Issue AP#9 to Kelvin Grove Underground to Straight Joint in Pit 249 (F1221)
Revoke WA#4 and WA#5 to City Substations
Issue TP#10 to Cable Test (TTF76 Cable Test)
Issue TP#11 to Cable Test (F1221 Cable Test)
Issue WA#12 to Field Test for functional testing @ SS ATC

(CB2762 & CB1221)
Revoke WA#12 to Field Test

Sunday 30th August 2009

Issue WA#13 to Field Test for functional testing @ SS ATC
CB1221 and F1221 Remote End Substations
Issue WA#14 to Field Test for functional testing @ SS ATC
CB2762 and TTF76 Remote End Substations
Revoke WA#13 and WA#14 to Field Test
Issue AE's
Remove All Operator Earths
Close CB1221 @ SS ATC

Close IS5308 @ SS CSB
Close LV Switch TR2 @ SS CSB
Close IS5070 @ SS WKS
Close LV CB TR2 @ SS WKS
Close IS4723 @ SS MIM
Close LV CB TR2 @ SS MIM
Close IS5376 @ SS CMC
Phase Out Across LV CB TR2 @ SS CMC
Close LV CB TR2 @ SS CMC
Close CB2762 @ SS ATC
Close IS5155 @ SS CCB
Phase Out Across LV CB TR2 @ SS CCB
Close LV CB TR2 @ SS CCB
Close IS5245 @ SS EHS
Make Customer LV CB TR2 Available @ SS EHS
Close IS5374 @ SS ANZ
Close LV CB TR2 @ SS ANZ
Close IS5375 @ SS ANZ
Close LV CB TR5 @ SS ANZ
Close IS4724 @ SS CWO
Close LV CB TR2 @ SS CWO
(Stage 3 Not Included in example)

B.3 Typical Commissioning Plan for 11kV Feeder Cutovers

Commissioning plan to create new 11kV feeders @ SSCMA.

Work Group	Role	Contact	Contact Number
Field Services	11kV Feeder Commissioning Coordinator	Jenson Button	0409 056 014
Substation Services	Commissioning Coordinator for Substation works	Ruben Barrichello	0409 056 015
Protection Systems	Field Test	Mario Andretti	0409 056 016
Condition Monitoring	Cable test	Dave Morgan	0409 056 009

Project: C0001234123

Tuesday 11th of November 2008 – AS1031650

1. Recover existing branch joint @ U1454341 AP#1.
2. Straight joint existing cable from P762592 to existing cable to IS54 @ SC108592, AP#1.
3. Straight joint new cable from IS30 @ X1083568 to existing cable from P1454340.
4. Authority to Energise No 1234567 for new 11kV cable works

Note: 11kV Network is required to be tied in overnight until completion of tomorrow's sheet.

Wednesday 12th of November 2008 – AS1031672

1. Recover branch joint U1499087 (CMA9B) @ SSCMA AP#1
2. Straight joint existing cable from IS26 @ X1083568 to new cable to CB1192 (new CMA19B), AP#1
3. Straight joint existing cable from IS31 @ X1083568 to new cable to CB1202 (new CMA20A), AP#2
4. Cable Test new 11kV feeders, TP#3
5. Authority to Energise No 1231234 for new 11kV Feeder works
6. Authority to Energise No 1231235 for Substation Works

Note: X90563 to be closed and SC1387910/IS15 to be opened as normally open point between CMA20A and CCY1B. IS13 @ SC475018 and IS26 @ SC560537 to remain normally open between CMA20A and CCY1B. IS20 @ SC474247 and IS53 @ SC1427683 to be left as normally open point between CMA15A and CMA20B. IS29 @ X1083568 to be opened and left as normally open point between CMA19B and CMA20A. (Confirmed with Network Planners)

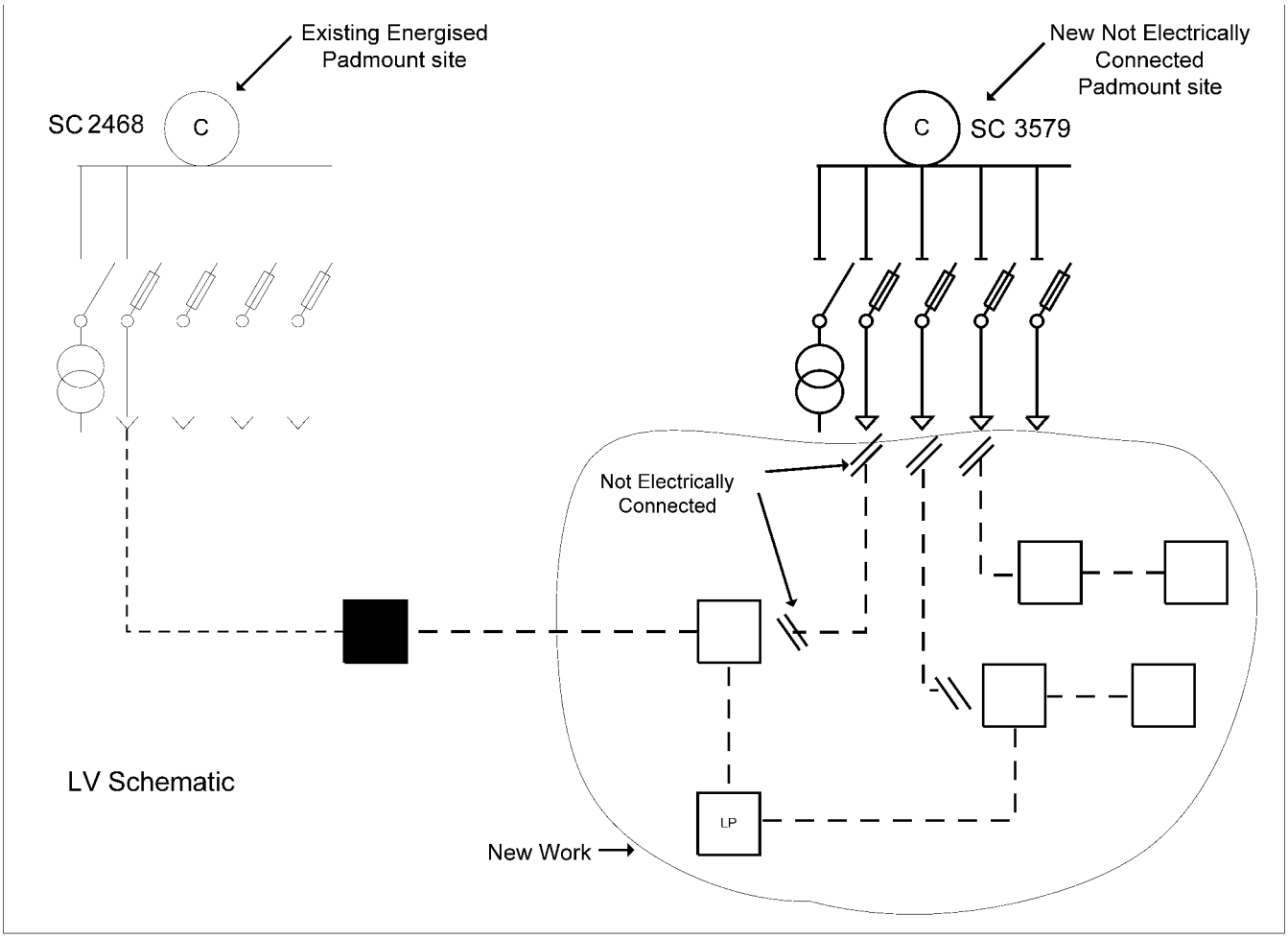
Thursday 13th of November 2008 – AS1031735

1. Commission new cable from IS71 @ SC714361 to CB1152 @ SSCMA (new CMA15A) AP#1
2. Cable Test new 11kV feeders, TP#2
3. Authority to Energise No 231238 for new 11kV Feeder works
4. Authority to Energise No 231237 for Substation Works

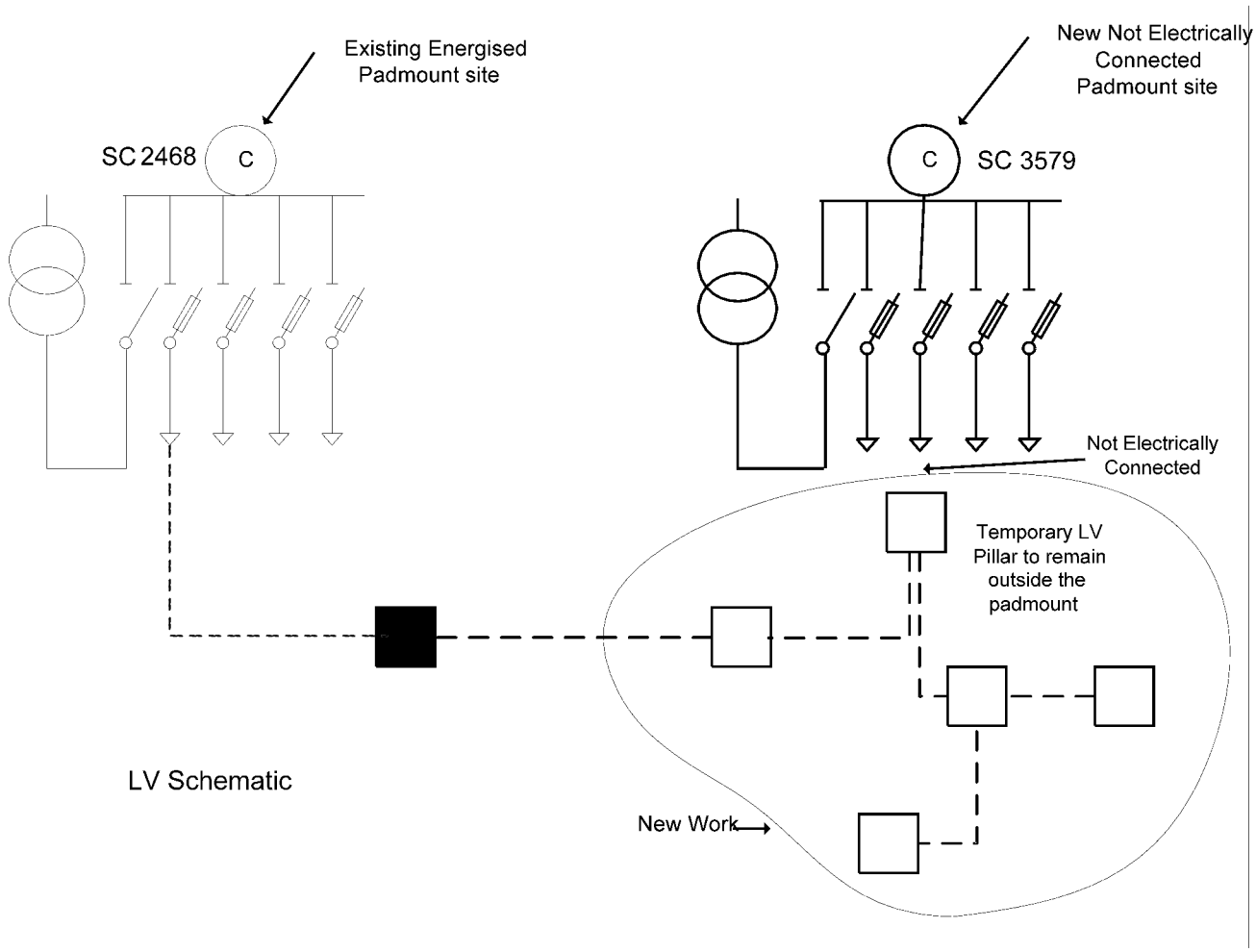
Note: IS60 @ X714362 to be left open as normally open point between CMA8A and CMA15A. X20223 to be left as normally open point between CMA15A and CCY7A

C Typical Examples for LV electrical apparatus associated with HV Not Electrically Connected Electrical Apparatus

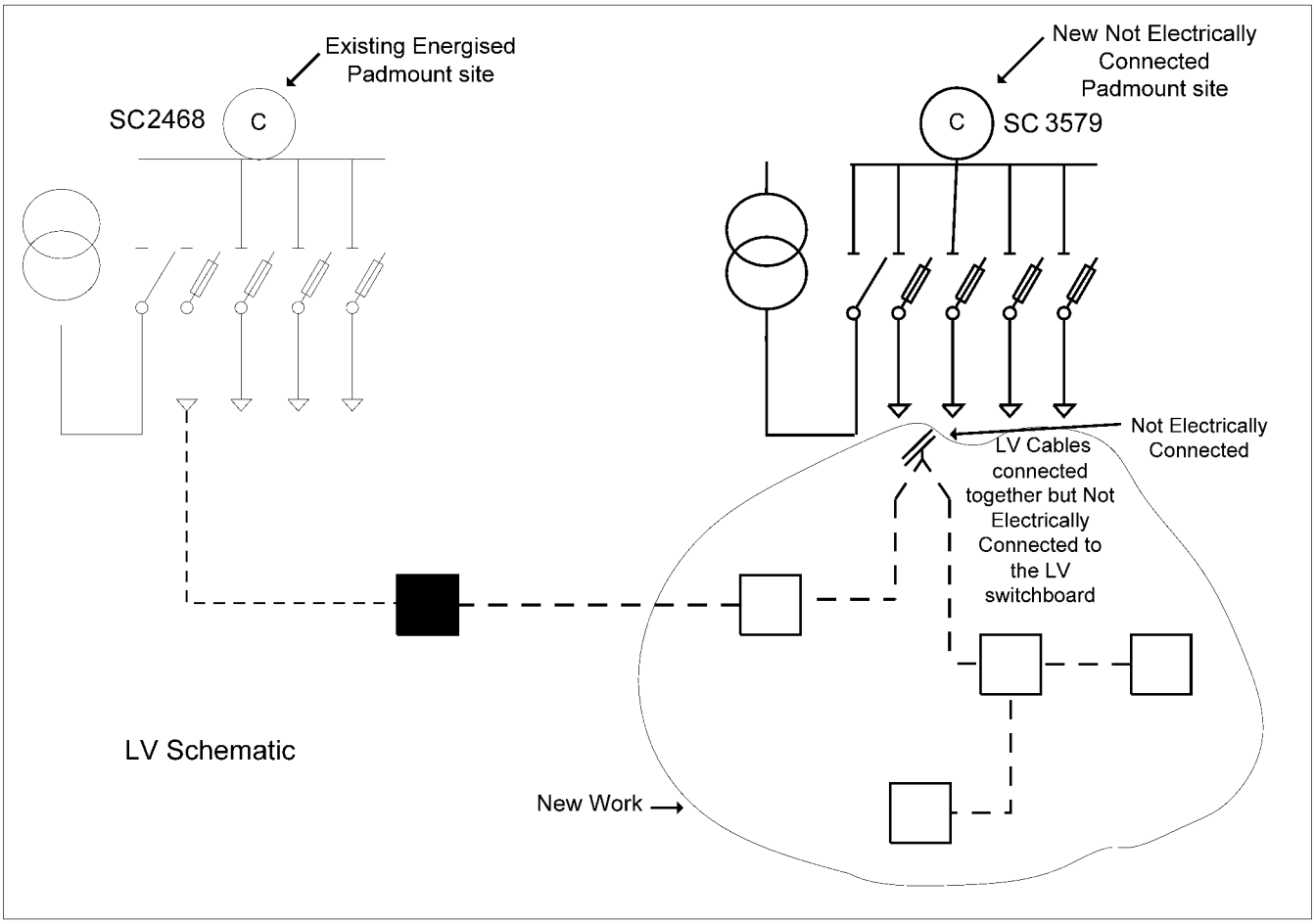
C.1 Typical Example for all Underground LV Cables Disconnected from a LV Switchboard at a Padmount Site



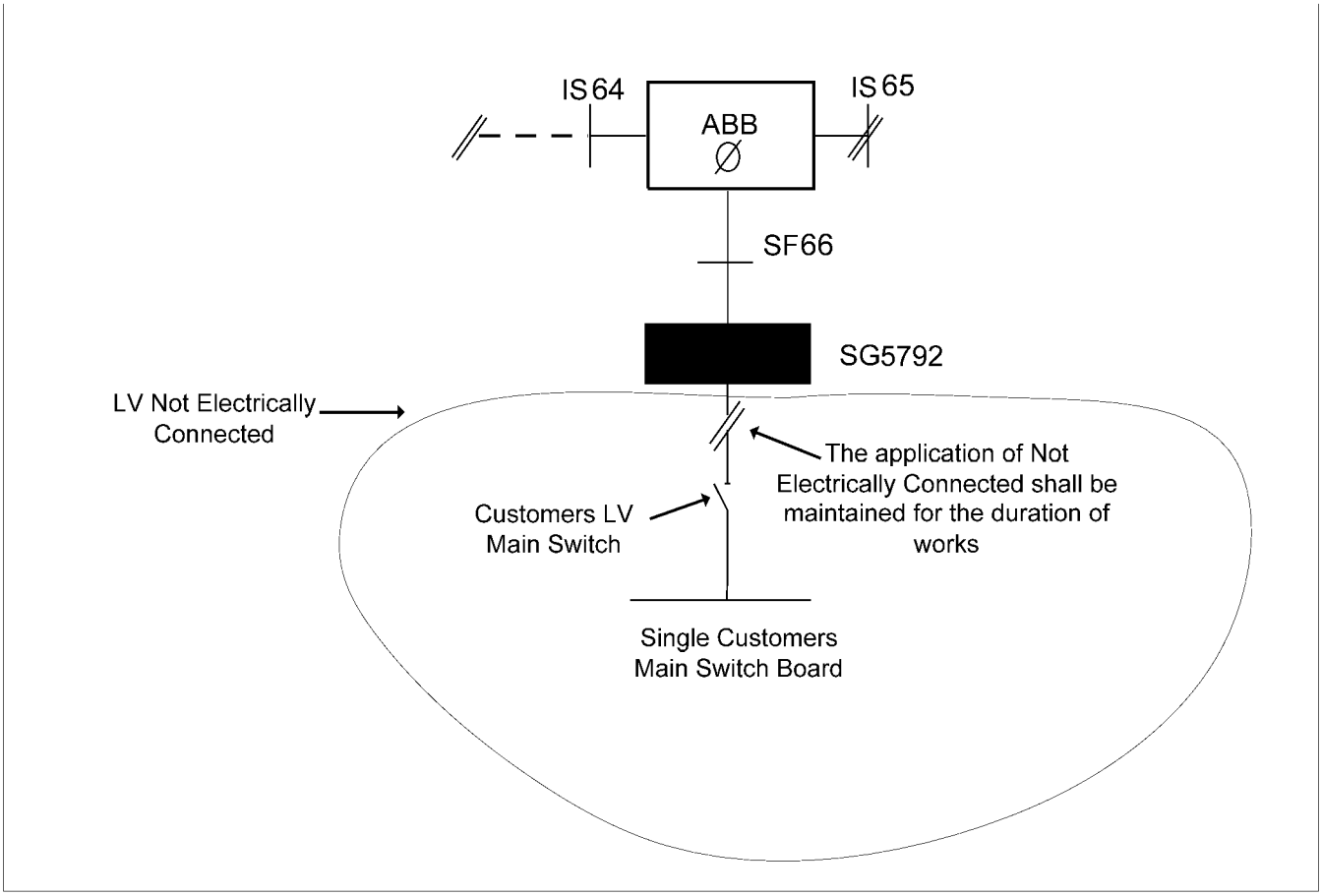
C.2 Typical Example for Underground Cables Disconnected from a LV Switchboard at a Padmount Site and LV cables Connected to a Temporary LV Pillar



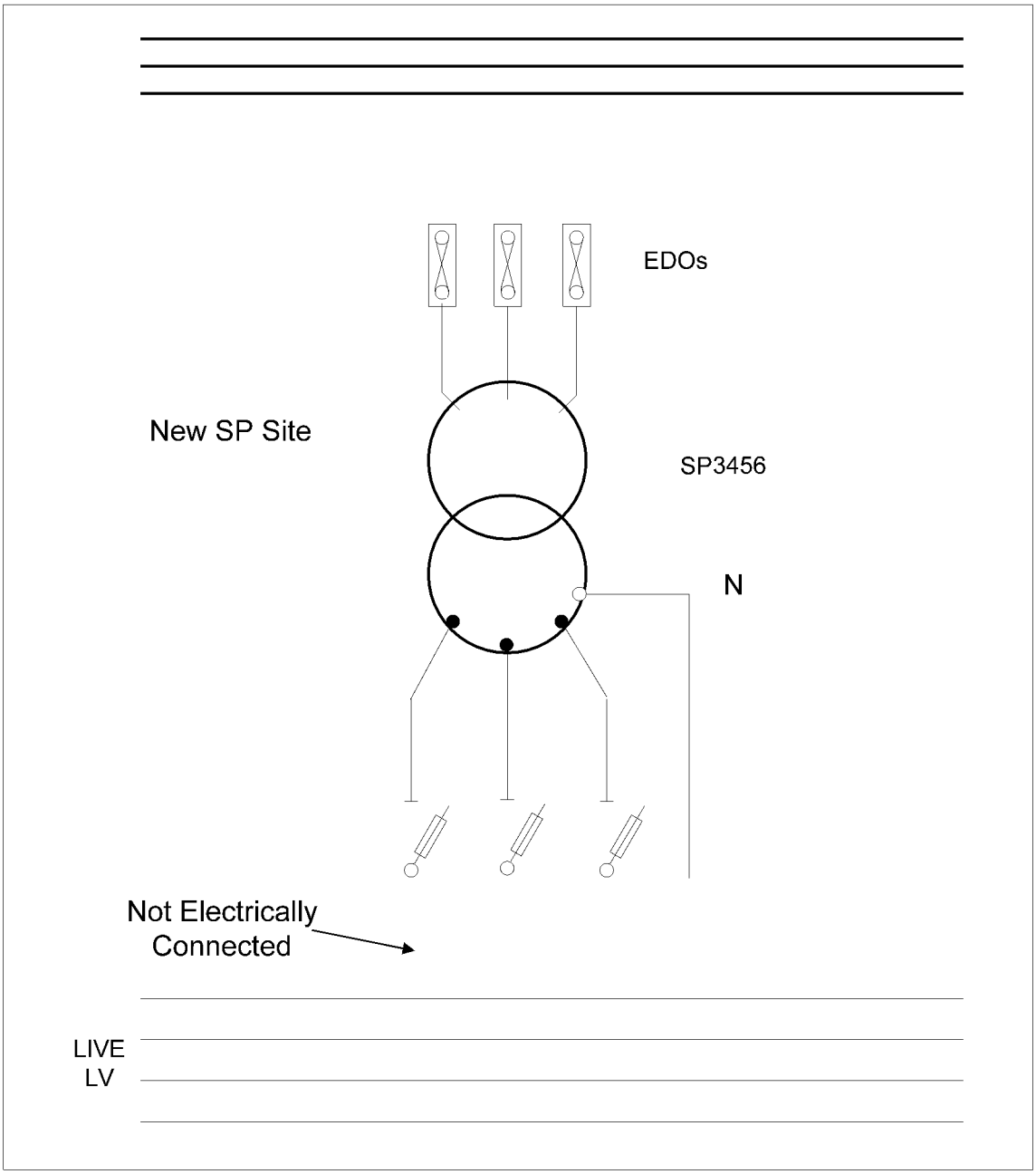
C.3 Typical Example for Underground Cables Disconnected from a LV Switchboard within a Padmount Cubical. The LV Cables are Secured, Connected Together Inside the Padmount Cubical. (Electrical Safety cannot be Compromised for this Temporary Work)



C.4 Typical Example for the Application of LV Not Electrically Connected for a Single Customer SG Site



C.5 Typical Example for the Application of LV Not Electrically Connected for a New SP Site



C.6 Typical Example for the Application of LV Not Electrically Connected for a New Single Customer SP Site