Isolation and Re-Energisation of 600v DC Tram OHW

Work Instructions

ENG-WIN-ELM-0081

1 Purpose and Scope

1.1 Purpose

This document outlines the approved safe working processes for undertaking isolations and the re-energisation on completion of the isolation, of the 600V DC overhead wiring system, and Parallel feeder cables on the Adelaide Tram Network. The sectioning and switching facilities for isolating the overhead wiring equipment and the feeder cables are achieved via the Tram DC traction power substations (referred to as Converter Stations) and Glengowrie Tram Maintenance Depot.

1.2 Scope

This Procedure applies to the following roles:

- Permit to Work Coordinator (PTWC)
- Electrical Maintenance Supervisor (EMS)
- Tram Controller
- Switching Crews
- Electrical Authorised Person (AP)
- Switching Attendant (SA)
- Electrical Nominated Person (NP)
- Person Responsible for Electrical Safety (PRES)
- Incident Manager (IM)

1.3 Definitions

The following definitions are applicable to this procedure.

TERM	DEFINITION
AP	Electrical Authorised Person
EMS	Electrical Maintenance Supervisor
Form B	Authority to Test & Apply Local Earths to OHW/ Authority to Issue OHW Certificates of Isolation
Form C	Certificate of OHW Isolation
IDF	Isolation Details Form
IPF	Isolation Planning Form
NP	Electrical Nominated Person
OCC	Operations Control Centre
PRES	Person Responsible for Electrical Safety

TERM	DEFINITION
PTWC	Permit To Work Coordinator
SA	Switching Attendant
SITREP	Site Report
TOA	Track Occupancy Authority

Table 1: Definitions

2 Roles and Responsibilities

2.1 Permit to Work Coordinator (PTWC)

- Assess both internal and external requests for isolation.
- Liaise with Electrical Maintenance Supervisor (EMS) and Tram Controller and gain endorsement of isolations where necessary.
- Ensure appropriate documentation and forms are provided to the Protection Officer.

2.2 Electrical maintenance supervisor (EMS)

- Evaluating application requests to determine if an isolation is required.
- Preparing an Isolation Planning Form (IPF).
- Checking and signing off the Isolation Details Form (IDF) supplied by the NP.
- Arrange for the preparation of the Authority to Test & Apply Local Earths to OHW, Form B. This is done by the Nominated Person.
- Deliver and brief the Isolation Details Form (IDF) and Form B to the Tram Controller who will arrange remote switching with the Electrical Nominated Person (NP).

2.3 Tram Controller

- Receive and understand the Isolation Details Form (IDF) and Form B, from the EMS or Nominated person (NP).
- Assess impacts of isolation on network operations and deem them acceptable to continue.
- On the night/day of the isolation the Tram controller and NP will exchange details of the Form B before the implementation of the isolation.
- Apply Tram Rules (Permit to Work) to protect isolation from Tram Movements.
- Operate remote Circuit Breakers/ Switches to isolated in accordance with Form B.
- Instruct NP or AP to operate lines side switches on behalf of the Tram controller as required.
- Issue Form B to NP on completion of switching.
- Receives the cancellation of Form B from the NP.
- Re-energise OHW in Coordination with the NP.
- Enter all Electrical Incidents / Switching operations / Forms / Authorities into the electrical Log.
- Liaise with Senior Tram Operator/ Incident manager as required.

2.4 Switching Crew

- The switching crew is a group of trained personnel who carry out lineside switching.
- The crew will comprise of Authorised Persons (AP) and Switching Attendants (SA).
- From this group one Authorised Person (AP) is designated as the Nominated Person (NP).
- There will be a minimum of two people in a switching crew:
- One person (AP) will perform the duties of a switching operator, the second person (SA) will carry out the duties of a checker.

2.5 Electrical Authorised Person (AP)

- A person who has been trained in lineside switching and holds current certification at Electrical Authorised Person Level 3, hold a current Class A electrical license and have been deemed component by Torrens Connect.
- Carries out lineside switching (Operator), under direction of the Tram Controllers.
- Tests the OHW under the instructions of the NP.
- Applies / Removes local earths as required under the instructions of the NP.
- Supervises the SAs that are carrying out Switching Attendant duties, Testing or Earthing under the instructions of AP.
- Signs the SA's Logbook, to verify Switching Attendant duties, and Testing or Earthing activities have been carried out.

2.6 Switching Attendant (SA)

- A person who has been trained and authorised as a Switching Attendant (SA).
- Carries out Switching Attendant duties (Checker), under supervision and authorisation of the AP.
- Tests the OHW, under the supervision and authorisation of the AP.
- Applies / Removes local earths as required, under the supervision and authorisation of the AP.
- Fills out the SA's Logbook and gets AP to verify Switching Attendant duties, and Testing or Earthing activities that have been carried out.

2.7 Electrical Nominated Person (NP)

- The Electrical Authorised Person in the Switching Crew who has been nominated to direct other members of the switching crew, or multiple switching crews.
- Prepares the Isolation Details Form (IDF) with information from the IPF supplied by the EMS and submit to EMS for checking & sign off.
- Prepares the Form B using the IDF and submits to Tram controller.
- On the night/day of the isolation the NP and Tram controller will exchange details of the Form B before the implementation of the isolation.
- Operate line side switches on the instructions from Tram controller as required.
- Receives and the Form B from the Tram controller upon completion of switching.
- Ensure OHW proven de-energised and earthed in accordance with Form B.
- Briefs the PRES on the working limits of an isolation and issue the PRES with a Certificate of Isolation, Form C.
- Upon completion of works, receives the Form C back from the PRES (can be multiple Form C's issued).

- NP to arrange approval of all earths associated with Form B.
- Cancel Form B with the Tram controller and coordinate Re-energisation.

2.8 Person Responsible for Electrical Safety (PRES)

- Receives the Form C from the Nominated Person (NP).
- Fully understands the working limits on the Form C.
- Briefs the work group on the limits of the Form C.
- Monitors the work group to ensure adherence to Form C requirements.
- Ensures all the work group, tools, plant and equipment are clear of the OHW and that the workgroup now treat the OHW as live, before relinquishing the Form C.
- Upon completion of works, cancels and returns Form C to the NP.

2.9 Incident Manager

- Incident response is done in accordance with **OPS-PRO-EMR-0001** - Tram Operations Incident and Emergency Management**.**

3 Isolation Procedure

The following section describes the procedures that need to be adhered to in order to safely isolate sections of the OHW and/or Feeder Cable.

When the OHW and/or Feeder Cable has been isolated it shall be treated as being live until it has been earthed and a Certificate of OHW Isolation, Form C, has been issued.

3.1 Types of Isolation

The isolations of the OHW sections fall in to two categories:

- Emergency De-energisation
- Planned Isolation
- Local Isolation

3.1.1 Emergency De-energisation

In the event of an emergency which may require the de-energisation of the OHW, the following steps are to be followed.

Step 1: Tram controller to receive notification of the emergency incident and establish situation as per an incident management procedure **OPS-PRO-EMR-0001** - Tram Operations Incident and Emergency Management**.**

Step 2: Tram Controller to follow the steps detailed in Emergency Isolation Form (IEF) to de-energise the section concerned by opening the relevant circuit Breakers and protect the site from Tram Movements.

Note: The Tram controller will assess which areas requires emergency isolation and will follow the de-energisation steps in Emergency Isolation Form (IEF).

Step 3: Tram controller to notify EMS or On-Call Electrical Technician and/ or Tram Operations Manager of the incident.

Note: EMS or On-Call Electrical Technician to assist the Tram Controller on following steps if on shift.

Step 4: De-energisation will remain until enough information is gathered pertaining to the location and the type of emergency.

Step 5: If emergency is short lived/false alarm or does not involve work then it is permitted to be re-energised.

Note: The Incident Manager is required to investigate the site and give the 'all clear' to the Tram controller to re-energise once it has been confirmed the emergency incident has ceased damage or risk to life and/or rail infrastructure.

Step 6: If any doubt, or emergency response will require work on or near the OHW, then proceed with the Planned Isolation procedure.

3.1.2 Planned Isolation

Planning Isolations of Overhead Wiring Equipment and/or Feeder Cables.

Isolations shall be planned in advance, except in the case of emergencies, and Isolation Planning Forms (IPF) and Isolation Details Forms (IDF) completed in accordance with the following:

1. Applications to work on or Near the Tram Network shall be made through the Permit to Work Process, ENG-PRO-PTW-0001.
2. The PTW Coordinator will submit to the EMS the Permit To Work Request so that the EMS can evaluate if an Isolation of the OHW and/or the Feeder Cable, and arrange the Issue of a Form C if required.
3. For the EMS to Evaluate the need for an Isolation of the OHW and/or parallel feeder cable and the requirements for a Form C, the following must be included in the Permit to Work application:
    a) The Nature of the work.
    b) The Overhead Line Pole Numbers between which the work is to be carried out referenced to the line(s) concerned.
    c) The duration of the work, stating preferred date and times.
4. The EMS shall produce an Isolation Planning Form for each isolation required (Isolation Planning Form ENG-FRM-ELM-0003). The Isolation Plan shall state:
    a) A unique Isolation Planning Form reference number.
    b) The date and times of the isolation.
    c) The lines affected.
    d) The electrical sections or sub sections.
    e) Allocate a unique reference number for each Certificate of Isolation (Form C) to be issued during the Isolation.
    f) The Overhead Wiring pole numbers of the limits of each Certificate of OHW Isolation (Form C).
5. The EMS shall issue the weekly Isolation Plan to the NP. The NP (ideally the same person who will be carrying out the isolation) to complete an Isolation Details Form (IDF) ENG-FRM-ELM-0002. The Isolation Details form shall contain the following:
    a) All details of each Certificate of OHW Isolation, Form C to be issued including the allocated unique reference number.
    b) Limits to be shown on the Certificate of OHW Isolation.
    c) Circuit breakers/ Manual switching required.
    d) Location of earths and if they are to be duplicates or singles.
    e) The use of any temporary jumpers.

6. Once the Isolation Details form has been completed by the NP, it must be submitted to the EMS. The EMS will check the IDF and once satisfied that it is correct, shall sign it and keep the original version. A copy is to be issued to the NP.
7. On completion of signing the IDF, the EMS shall arrange the Form B as detailed in section 3.3 of this document. The Tram controller will then follow the tasks detailed in the same section (3.3) of this document and along with the NP (in the field), complete the switching (off) of the required circuit breakers and switches (both remotely and in field).
8. The Tram controller and the NP will follow the procedure detailed in section 3.4, before issuing Form B.
9. Testing and applying of local earthing would be carried out by the NP/AP as detailed in sections 3.5 and 3.6 of this document.
10. On the completion of testing and applying of the local earth, the NP then shall issue the Form C as detailed in section 3.7.
11. This would complete the isolation process of the planned section/subsections.

3.1.3 Local Isolation

Local isolation can be applied at the tram depot at Glengowrie. For local isolation procedures refer to work instruction 'Isolation Procedures for Glengowrie Depot Yards and Barns' ENG-WIN-ELM-0004.

3.2 Facilities for Isolating and Earthing Overhead Wiring Equipment.

The sectioning and switching facilities for isolating the overhead wiring equipment and feeder cable are shown on the Minor Sectioning diagrams.

The isolation of Overhead Wiring equipment is affected by the opening of circuit breakers and manually operated Overhead Wiring switches. The switches are operated only by staff who have been trained and authorised for this purpose and then only on the direct instructions of the Tram Controller.

When a switch has been operated and locked into the instructed position, a caution notice is displayed on the switch to indicate the switch is in a position to secure an isolation.

In the case of a "Normally Open" switch, the caution notice is permanently displayed and removed only when operated from the normally open position. If the area to be Isolated relies on a Normally Open switch to be in its Normally Open position the switching crew must check that this switch is in its Normally Open position.

3.3 Switching Off the Overhead Wiring Equipment

The NP shall record in Part 1 of the Authority to Test (Form B), all the switches and circuit breakers effecting the isolation and shall brief the Tram controller of the details. The Tram controller will communicate / exchange the details of the Form B to the NP who shall record the information on the NP's copy of the Authority to Test, Form B.

Before a Form B can be issued to an NP the Tram controller shall, switch off the section(s) or subsection(s) of OHW as specified below, as instructed by the EMS or NP on the Form B:

1. In conjunction with tram control, block the necessary line(s) or route(s), using the appropriate Tram Rules. In this case Track Occupancy Authority (TOA).
2. Open, or arrange to open, the circuit breaker(s) necessary to:

a) Switch off the complete section(s) concerned; or
b) Ensure that the overhead Wiring switch(es) concerned are not carrying load current at the time of operation; and

3. Prevent inadvertent operation of the circuit breaker(s) on the SCADA interface and direct the field crews to stand clear during remote operation of circuit breakers or switches.

The person authorised to carry out overhead wiring switching operations shall operate and lock in the instructed position the switch(es) and affix a caution notice to the switch handle.

When the overhead wiring switch(es) has been operated, locked in the instructed position and caution notice(s) applied, the NP shall communicate the completion of the switching to the Tram controller.

3.3.1 Alternative Feed Switches

When, as part of an isolation, an alternative feed switch is required to be operated, the person(s) authorised to carry out overhead wiring switching operations shall on the instruction of the Tram controller, operate and lock the switch in the instructed position. The AP shall affix a caution notice to the switch handle.

3.3.2 Normally Open Switches

When a “Normally Open” switch is required to be operated, for whatever reason, the person(s) authorised to carry out overhead line switching operations shall, on the instruction of the Tram controller, first remove the caution notice fixed to the switch handle and operate and lock the switch in the instructed position.

3.3.3 Isolation of an Electrical Subsection that can be isolated under local Instructions

When it is required for an isolation of electrical subsection(s) in sidings, where local isolation is allowed, to be combined with an isolation of abutting electrical section(s), where local isolation is not allowed, the local isolation procedure shall be suspended.

3.4 Issue and receipt of Form B

The authority from the Tram controller to the NP is in the form of a numbered message which they both record on their own copy of an identical Form B. Before the issue of a numbered message the Tram controller shall exchange details of the electrical section(s) or subsection(s) switched off, the lines concerned, the limits of isolation, switching requirements and the time by which the authority is to be cancelled from the control room copy of form B to the NP.

When the NP is satisfied that the switching detailed on the Form B is completed, and on confirmation with the Tram controller regarding the remote switching, The Tram controller shall authorise the testing of the OHW by the NP giving a numbered message to the NP, which both shall enter in Part 1 of their Forms B. Each separate Form B shall bear a unique message number.

In the event that equipment fails to operate, the isolation must be abandoned to allow fault finding to take place.

If in unusual circumstances there is an overhead wiring switch(es) within the isolation which is not in the normal position, the NP and Tram controller both shall record the number(s) and position of the switch(es) concerned in Part 1 of their Forms B.

The NP shall then carry out or arrange to carry out overhead wiring testing and earthing operations, the procedures detailed in sections 3.5 and 3.6 of this document.

The NP shall retain the form B and remain on duty, readily contactable and available at all times until the Form B is cancelled or taken over by a relieving NP.

3.5 Testing the Overhead Wiring Equipment

On confirmation (with the Tram controller) of the remote switching (off) of the OHW and when the manual 'switch off' is complete, then the NP shall carry out the following procedure, except when another person(s) so authorised to carry out overhead wiring testing and earthing operation, and acting on the NP's instructions, may on NP's behalf test and apply local earths.

Each separately isolated electrical section or subsection of OHW, to which earths are to be applied, shall be tested with an approved voltage testing device prior to the application of the earths, to ensure that earths are not applied to overhead wiring equipment live at 600V DC. If local earths are to be applied at any significant distance from the point where the section or subsection is first tested, and/or the track layout is sufficiently complex to warrant it, the OHW shall be tested at the location prior to the application of the earths.

Refer to Work Instructions: Inspection, Use, Maintenance and Testing of HV Insulated Sticks, ENG-WIN-ELM-0006 and Use and Inspection of Voltage Detectors, ENG-WIN-ELM-0008.

3.6 Adelaide Tram Network, Earthing of the 600V DC Overhead Wiring (OHW) Equipment

3.6.1 Application of Local Earths

When the OHW has been proved to be switched off by the use of an approved voltage testing device, duplicate local earths shall be applied using approved portable earthing equipment, on each side and in proximity to, or at the working limits of the working party on each separately isolated electrical section or subsection to be covered by the Form C.

Local Earths may be applied in converter stations in place of earths applied to the OHW provided there is electrical continuity between the OHW and the earth in the substation. Refer to Work Instruction ENG-WIN-ELM-0010, Apply Earth Leads.

3.6.2 Location of Local Earths

Sufficient intermediate local earths shall be applied within the working limits such that the distance between local earths does not exceed 400 metres except when all the following conditions apply:

a) All adjacent OHW is isolated; and
b) There are no adjacent overhead transmission power line; and
c) There are no tee-feeds; and
d) There are no intermediate points of possible inadvertent Energisation.

In which case intermediate local earths may be applied at a maximum spacing of 3200 metres.

Note 1: The term 'adjacent overhead transmission power line' is defined as an overhead transmission power line which operates at a nominal phase to phase voltage exceeding 33,000 volts (33kV), the location of which is indicated by overhead wiring structure numbers on the Minor Sectioning Diagrams.

Where an adjacent overhead transmission power line exists, the spacing of local earths between the overhead wiring structure numbers shown on the Minor Sectioning Diagram shall not exceed 400 metres.

Note 2: The overhead wiring structure numbers are those of the nearest designated earthing points at, or outside, the extremities between which the 400-metres maximum spacing applies. The extremities are set to include those power lines which:

- Run or approach within a distance of 100 metres from the railway; or
- Cross the railway at an included angle of 0° to 70°. In this case the extremities are set to include the area where the power line is within 100 metres of the overhead wiring equipment.

3.6.3 Terminal End

In the case of a terminal end, when all adjacent OHW is isolated and where no adjacent overhead transmission power lines exist, the duplicate local earths at the terminal end shall be applied at no greater distance than 3200 metres from the terminal end provided the earths are applied between the terminal end and any tee-feed, or intermediate point of inadvertent energisation.

3.6.4 Continuity of Overhead Wiring Equipment between Local Earths

The electrical continuity of the OHW shall be maintained uninterrupted between successive local earths. If, in unusual circumstances, the OHW is not electrically continuous between successive local earths, the OHW on each side of the electrical discontinuity shall be separately tested and earthed. The local earths on each side of the discontinuity shall be in duplicate and applied within a distance of 75m from the discontinuity.

The electrical continuity of the OHW between successive local earths may be carried through the busbar at a Converter station provided the busbar is isolated and locked off from all sources of electrical supply by means of isolators or overhead line switches. The Tram controller shall maintain all circuit breakers which are providing the electrical continuity in the closed position.

3.6.5 Continuity Jumper

Where it is necessary to apply continuity jumpers after the equipment has been earthed, but before a Certificate of OHW Isolation, Form C, has been issued such jumpers shall have been planned in advance and included on the Isolation Details Form. The jumpers shall be applied and subsequently removed using approved portable earthing equipment. Part 2 of the Form B shall be endorsed with the details of the continuity jumpers.

3.6.6 Parallel Feeder Cable

The feeder cable will normally be earthed by applying local earths to the Overhead Trolley wire as described in section 4.11 of this document. If there are lineside switches connecting the OHW to the Feeder cable these switches must be maintained in the closed position and have a caution notice fixed to them if they are integral to the earthing of the feeder cable.

If a tap to trolley connection is integral to the earthing of the feeder cable, by means of the earths applied to the trolley wire, the tap to trolley connection must not be removed during the works.

Alternative methods may be used to earth the Feeder cable. These methods must be approved by the EMS and detailed on the Form B.

3.6.7 Disturbance, Interference, or Removal of local earths

Local Earths shall not be disturbed or interfered with whilst the Form(s) C are in force and not finally removed until all Forms C are cancelled.

Where this is unavoidable, single intermediate local earths may be removed only after sufficient additional local earths have been applied to the OHW such that spacing between successive earths does not exceed that specified in the clause “Location of Local Earths”. Such removal and application of local earths shall only be done by a person(s) authorised for such activities, and then only on the instruction of the NP, who shall record details on the form B and inform the Tram controller.

If OHW work is required at the structures at which the duplicate earths are applied forming the extremity of the working limits of the Form C, and this work would disturb the duplicate earths, then additional isolation and/or earthing shall be carried out to extend the Form C limits.

3.7 Issue of Certificates of OHW Isolation (Form C)

The NP shall first ensure that all necessary testing, earthing etc, to enact the isolation, has been completed.

The NP shall then issue a Form C to the PRES responsible for the working party requiring the isolation. The name of the PRES and their certificate number shall be recorded by the NP in Part 1 of the Form C.

Where there is more than one working party that requires the same OHW section(s) to be isolated the Electrical Nominated Person shall issue in person, a separate Form C to each PRES of each working party requiring the isolation. Each Form C shall bear a different message number.

NOTE: Where the work being undertaken has been identified as not requiring an electrical isolation, a Form C shall not be issued to the PRES.

The NP issuing the Form C shall ensure that the PRES fully understands that the issue of the Form C does not mean that tram movements are stopped on the lines concerned. If this is necessary, the Protection Office in charge of the work group must make the necessary arrangements with Tram Control in accordance with the Tram Rule Book.

The NP issuing the Form C shall ensure that the PRES fully understands the working limits stated on the Form C.

The NP issuing the Form C shall also ensure that the PRES is made aware of live equipment adjacent to or crossing over the earthed equipment, which is live and which is earthed.

The PRES shall sign Part 1 of the Form C and in turn ensure that each person, for whom they are responsible, fully understands these conditions before the person commences any of the work for which the isolation is necessary and has signed onto part 4 of the Form C.

The PRES will retain the Form C and remain on duty and in control of the work group until the work is completed or terminated and all persons covered by the Form C are clear of the line and have signed off on Part 4 of the Form C or until relieved by another PRES and the Form C is transferred.

The NP shall record particulars of all Forms C issued and the details of local earths applied in Part 2 of the Form B. At the earliest opportunity, the NP shall inform the Tram controller, who shall also record the relevant information in Part 2 of their Form B.

3.7.1 Alternative Arrangements for the Issue of Certificates of OHW Isolation

Alternative arrangements for the issue of Forms C shall be implemented only if:

- It is impracticable to comply with the normal arrangements; and
- The alternative arrangements have been planned and approved by the Infrastructure Maintenance Manager or the EMS.

The Tram controller shall clearly identify (by marking the appropriate box on the Form B), that alternative arrangements have been used.

3.8 Procedure when Staff Changes take Place

3.8.1 Change of Electrical Nominated Person

If the NP who received the Form B is relieved, they shall ensure that the relief fully understands the extent of the isolation and the time it is due to be cancelled and shall handover to the relief their copy of Form B, showing all Forms C's issued for work being done under the isolation. The relief shall at the earliest opportunity inform the Tram controller that they are taking up the duties giving their name and that of the person they are relieving. The Tram controller and the relief shall record the relevant information on their copies of Form B.

The relief shall retain the form B in their possession and remain on duty, readily contactable and available at all times until the Form B is cancelled or they are relieved.

3.8.2 Change of PRES

If the person who has received the Form C is relieved, they shall hand to the relief the Form C which both shall sign in Part 2. The person being relieved shall ensure that the relief's name and certificate number are recorded in Part 2 of the Form C. They shall inform the relief of the conditions set out in the clause entitled "Issue of Certificates of OHW Isolation". The relief shall inform the NP (either directly or via the Tram controller), who shall record the change in Part 2 of the form B. The NP shall at the earliest opportunity inform the Tram controller who shall record the relevant information on the Form B.

3.9 Isolation Procedures for Glengowrie Depot Yards and Barns

Isolation & re-energisation procedures at Glengowrie Tram Depo should be as per ***ENG-WIN-ELM-0004 - Isolation Procedures for Glengowrie Depot Yards and Barns***.

4 Cancellation of Certificates of OHW Isolation (Form C)

On completion of the work or at such other stage in the work as may prove necessary and practicable, all persons and materials shall be cleared from proximity to the OHW, and the PRES shall ensure all members of the work group have signed out on part 4 of the Form C. The PRES shall complete Part 3 of the Form C declaring that the OHW is fit for the passage of Electric traction or other declaration as necessary and return it to the NP. The NP shall sign Part 3 thereof and enter the time and date of cancellation in Part 2 of the Form B.

4.1 Lost or Misplaced Certificates of OHW Isolation

In the case of a lost or misplaced Form C the PRES shall advise the NP immediately its loss or misplacement is discovered. The NP shall arrange for another Form C, endorsed “Duplicate”, to be issued to that PRES to allow work to continue.

4.2 Removal of Local Earths

When Forms C are in their possession and cancelled, the NP shall carry out, or instruct AP(s) to carry out the removal of all local earths associated with each Form C using approved portable earthing equipment.

4.3 Cancellation of Form B

The NP shall inform the Tram controller that all Forms C are cancelled and have been returned to the NP. Both the NP and Tram controller will record the cancellation times on Part 2 of their copy of the Form B.

The NP will inform the Tram controller that local earths have been removed.

The NP shall then issue a numbered message to the Tram controller, and both shall complete Part 3 of their copy of Form B, cancelling the authority (Form B) and declaring that the OHW is fit for the passage of electric traction.

The NP who cancelled the Form B is responsible for returning the field copy of the Form B and the Form C (s) to the EMS, for filing, audit, and incident review.

The EMS is responsible for collecting the Tram control copies of the Form B for filing, audit, and incident review.

4.4 Making the Overhead Wiring equipment Live

After cancellation of Form B, field switching can occur together with the field crew. The Tram controller shall:

- Ensure that the switch(es) concerned are not carrying load current at the time of operation.

The Tram controller shall operate or instruct the NP to carry out overhead wiring switching operations, to operate and lock in the instructed position the overhead wiring switch(es) as necessary to achieve the Energisation of the OHW.

The person(s) authorised to carry out overhead wiring switching operations shall operate and lock in the instructed position the switch(es) and remove any cautionary notices affixed to the switch handle(s).

When the switch(es) has been operated, locked in the instructed position and caution notice(s) removed, the NP shall confirm this to the Tram controller.

The Tram controller shall then close the appropriate circuit breaker(s) to permit electric tram operation and cancel/fulfill the TOA (Track Occupancy Authority) if appropriate to do so.

4.5 Numbering System

Each Isolation Details Form, Isolation Planning Form, Form B and Form C shall have its own unique number.

This number through to the Form C is as follows:

- The Permit to work application is received and the EMS allocates a number to the Permit to work Application which relates to the date the of the Application is received by the EMS, and the number of Access Applications received on that day. E.g., If the EMS received the first Access application on the 29th of June 2020, then this Access application would adopt the following number: 20200629-WR-01. Any other subsequence Permit to work application on the same date will have the prefix 20200629-WR-02 etc. This will then be entered into the IPF for the week concerned.
- The numbering of the Isolation Planning Form will be by the week and year. E.g., Week 1 2020. The Permit to work application will be recorded on the IPF for the correct week of the isolation.
- The numbering of the Isolation Details Form will be the date of the Isolation, e.g. If the date of the isolation for the Permit to work application above (20200629-WR-01) was the 1st July 2020 the IDF would be numbered 20200701-IDF-01. Any other subsequent Permit to work applications requiring an isolation on the same date will have the prefix 20200701-IDF-02.
- The numbering of the Form B will also be the date of the Isolation, e.g., with the above Isolation Planning Form the Form B number would be 20200701-FB-01. Any subsequent isolation on the date will have the prefix 20200701-FB-02.
- The numbering of the Form C will also be the date of the Isolation, e.g., with the above Form B the Form C number would be 20200701-FC-01. Any subsequent isolations on the same date will have the prefix 20200701-FC-02.

4.6 Message Numbers

The message number shall be based around the 24-hour clock at the time Authority is given or cancelled. E.g., if authority is given at 10 to midnight the message number is 2350.

5 Associated Documents

Document ID	Title
ENG-PRO-ELM-0001	600V DC Electrical Safety Instructions Tram
ENG-PRO-PTW-0001	Permit to Work
ENG-FRM-ELM-0002	Isolation Details Form (IDF)
ENG-FRM-ELM-0003	Isolation Planning Form (IPF)
ENG-FRM-ELM-0004	Certificate of OHW Isolation (Form C)
ENG-FRM-ELM-0005	Authority to Test & Apply Local Earths to OHW/ Authority to Issue OHW Certificates of Isolation (Form B)
ENG-FRM-ELM-0011	Emergency Isolation Form (IEF)
ENG-WIN-ELM-0006	Inspection, Use, Maintenance and Testing of HV Insulated Sticks
ENG-WIN-ELM-0008	Use and Inspection of Voltage detectors
ENG-WIN-ELM-0010	Apply Earth Leads
ENG-WIN-ELM-0004	Isolation Procedures for Glengowrie Depot Yards and Barns
OPS-PRO-EMR-0001	Tram Operations Incident and Emergency Management
TP2-DRG-000077	Symbols for use on Minor Sectioning Diagrams
TP2-DRG-000078	Adelaide North Terrace Schematic
TP2-DRG-000432	Adelaide North Terrace Schematic
TP2-DRG-000433	King William Road Schematic
665-A3-08-1	Minor Sectioning Diagram Adelaide City Centre Schematic
665-A3-08-2	Minor Sectioning Diagram Wayville Schematic
665-A3-08-3	Minor Sectioning Diagram Black Goodwood Schematic
665-A3-08-4	Minor Sectioning Diagram Black Forest Schematic
665-A3-08-5	South Road to Beckman Street Schematic

Document ID	Title
665-A3-08-6	Marion Area Schematic
665-A3-08-7	Plympton to Morphett Road Schematic
665-A3-08-8	Morphett Road Schematic
665-A3-08-9	Glengowrie Tram Stop to Brighton Rd Schematic
665-A3-08-10	Brighton Rd to Moseley Square Schematic
665-A3-08-11	Glengowrie Schematic
665-A3-08-12	Entertainment Centre Schematic