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Code of Practice 612

Issue 4 September 2023

Operational Procedures Associated with Electricity Supplies for Traction and Purposes on Network Rail AC and DC Electrified Lines

Electricity North West Limited. Registered in England & Wales. Registered No. 2366949. Registered Office: Borron Street, Stockport, SK1 2JD

Amendment Summary

ISSUE NO. DATE	DESCRIPTION
Issue 4 **September 2023**	Updated to new CP template. Removal of Natland (decommissioned site). Consequential changes of DSMC to NMH. Prepared by: Paul Ward Approved by: Policy Approval Panel and signed on its behalf by Paul Turner, PAP Chairperson

Contents

1 Foreword

Engineering Recommendation G38/1 has been prepared by the Electricity Supply Industry (ESI) in conjunction with Network Rail and sets out the procedures to be followed by ESI and Network Rail personnel when working on equipment associated with electricity supplies for traction purposes on ac and dc electrified lines.

It is important to note that G38/1 is a joint ESI/Network Rail document and was agreed prior to the introduction of the fourth and subsequent editions of the Model Distribution Safety Rules. In issuing G38/1 as part of Electricity North West Limited Code of Practice 612 the following have been adopted:

- The definitions (Section 4) have been taken from Engineering Recommendation G38/1 and updated to reflect organisational changes and Network Rail changes to documentation. There are some minor differences from the Fourth and subsequent editions of the Distribution Safety Rule definitions, but these are not considered to be significant enough to present any problems.
- The Electricity North West Limited model safety documentation in Appendix A is taken from the 2005 Edition of the Electricity North West Limited Distribution Safety Rules and the specimen CSC is based on CP605. The Network Rail safety documentation in Appendix A is taken from Network Rail Line Specification RT/E/S/21067. This documentation does not vary significantly from the model forms included in G38/1.
- REC has been replaced with Electricity North West Limited.

2 Scope

This document details the procedures to be adopted by Electricity North West Limited and Network Rail personnel when working on equipment associated with electricity supplies for traction purposes on ac and dc electrified lines. The document is based on Engineering Recommendation G38/1 and details Electricity North West Limited specific items.

3 Introduction

This document shall be read in conjunction with the appropriate Electricity North West Limited and Network Rail Safety Rules and does not authorise any departure from those rules.

This document has been agreed between Electricity North West Limited and Network Rail. Subsequent reference to Network Rail shall mean any Network Rail Zone.

This document sets out the operational and safety procedures to be adopted at Electricity North West Limited substations that provide high voltage supplies to Network Rail for traction purposes on ac and dc electrified lines and at the associated Network Rail Feeder Stations. Details of the supply points covered by these procedures are given in the appropriate 'Schedules of Responsibility' as defined in Appendix C of this document.

This document shall be available to all personnel involved in the operation and maintenance of 132/25kV Electricity North West Limited substations and Network Rail Feeder Stations referred to above. A copy will also be held at:

(a) All operational locations associated with high voltage traction supplies

(b) Network Rail electrical control room(s)

(c) Electricity North West Limited control room(s)

4 Definitions

Circuit State Certificate	A form of declaration detailing the isolation and earthing carried out on high voltage apparatus where there is an Electricity North West Limited /Network Rail control interface. The document is issued and cancelled by an Electricity North West Limited Senior Authorised Person in accordance with CP605 or a Network Rail Nominated Person, using form 21067/C, in accordance Network Rail Line Specification RT/E/S/21067, as appropriate.
Competent Person	A person who has sufficient technical knowledge or experience to enable him to avoid danger.
Control	The direction of operations on electricity supply systems.
Distribution Control Engineer	(a) For a centrally controlled system, the Control Engineer at the Company's Distribution Control Centre; (b) For a locally controlled system, the engineer specifically deputed to exercise the function of Control, from a local control point.
Generation Control Engineer	The shift engineer or other person appointed by a Generating Company for regulating the generation of electrical energy and for the operation of switchgear at a generating station.
Grid Control Engineer	An engineer appointed by the National Grid Company and on duty at a Grid Centre, for the purpose of controlling the generation and transmission of electrical energy and its supply to, or between Companies, and in certain instances its supply to other bodies e.g. Network Rail.
Electricity North West Limited Authorised Person	A Competent Person over 18 years of age, adequately trained, and possessing technical knowledge and appointed in writing by Electricity North West Limited to carry out specific Operations and/or work on their system apparatus or plant.
Electricity North West Limited Control Engineer:	An engineer employed by Electricity North West Limited and on duty for the appropriate level of control as further defined below. In England and Wales the functions of Grid and Generation Control are administered by the NATIONAL GRID, whereas that of Distribution Control is administered by the Electricity Companies.

Electricity North West Limited Senior Authorised Person	An Authorised Person who has been appointed in writing by Electricity North West Limited to issue and cancel Permits-To-Work, Sanctions-For-Test, Limitations-of-Access, Isolation Requests and Circuit State Certificates.
Electricity North West Limited Permit-To-Work	A form of declaration signed and given by a Electricity North West Limited Senior Authorised Person, to a person in charge of work to be carried out on any earthed high voltage apparatus, for the purpose of making known to such person exactly what apparatus is dead, isolated from all live conductors, has been discharged, is connected to earth and on which it is safe to work.
Electricity North West Limited Sanction-For-Test	A form of declaration signed and given by a Electricity North West Limited Senior Authorised Person, to a person in charge of testing of high voltage apparatus for the purpose of making known to such person exactly what apparatus is to be tested and the conditions under which the testing is to be carried out.
Incoming Feeder Circuit Breaker (Typical Network Rail Supplies)	The circuit breaker located at a Network Rail Feeder Station controlling the lower voltage side of an incoming transformer or cable circuit, through which supply is afforded to a Network Rail switchboard (see Figure 1).
Key Safe	An approved device for the secure retention of all keys used to lock means of isolation, earthing or other safety devices necessary for the issue of Permits-To-Work or Sanctions-For-Test. (Where Key Safes are not provided satisfactory local arrangements should be made to cover these situations).
National Grid Permit-For-Work	An equivalent form to the Electricity North West Limited Permits-To-Work as used by National Grid. (For clarity, the term Electricity North West Limited Permits-To-Work is used throughout the text of this document but refers to either document where appropriate).
Network Rail Authorised Person	A Competent Person over 18 years of age possessing sufficient knowledge to carry out specific work on Network Rail systems or apparatus and appointed by or on behalf of Network Rail to do so.
Network Rail Electrical Control Operator:	The person for the time being in charge of the Network Rail electrical control room having control of the power supply to the electric traction system and who is responsible for all operations.
Network Rail Feeder Station	A Network Rail feeder station at which a supply for traction purposes is received from Electricity North West Limited.
Network Rail Local Manager	The appropriate Network Rail Officer responsible for the traction supplies involved.
Network Rail Nominated Person	An Authorised Person over 20 years of age who has been appointed to issue and cancel Network Rail Permits-To-Work, Network Rail Sanctions-For-Test

	and Circuit State Certificates in accordance with the latest issue of Network Rail Line Specification RT/E/S/21067.
Network Rail Permit-To-Work	A statement on form 21067/P in accordance with Network Rail Line Specification RT/E/S/21067 that particular apparatus is safe to work on.
Network Rail Sanction-For-Test	A statement on form 21067/S in accordance with Network Rail Line Specification RT/E/S/21067 that particular apparatus has been isolated and earthed, and which permits the temporary removal of earths for testing.
NMH	Network Management Hub – Electricity North West Control Centre
Operation	The local or remote switching, isolation or earthing of electrical apparatus.

5 Schedules of Responsibilities

The Electricity North West Limited schedules detail the boundaries of control responsibility at Network Rail Feeder Stations and at Electricity North West Limited substations together with the organisations responsible for the issue of safety documentation and the relevant Safety Rules. The schedules have been included as Appendix C to this Document.

A copy of the relevant Schedule shall be displayed in both the Electricity North West Limited substations and their associated Network Rail Feeder Stations.

6 Outage Programming

All outage programming shall be co-ordinated between the Operation Planning Engineer of Electricity North West Limited and the Network Rail Zones or their appropriate delegated representatives.

In an emergency, the Electricity North West Limited Control Engineer shall communicate directly with the Network Rail Electrical Control Operator.

7 Control Procedures

7.1 Normal Operation of the Incoming Feeder Circuit Breakers

On typical supplies (see Figure 1), the Network Rail Electrical Control Operator controls and operates the Incoming Feeder Circuit Breakers and any associated isolators, which supply their busbars within the boundaries of Network Rail responsibility, as defined in the agreed schedules, to suit their system requirements. He shall consult with the Electricity North West Limited Control Engineer before carrying out any of these switching operations.

Confirmation of a change of system state shall be logged at both the Network Rail Electrical Control Room and Electricity North West Limited Control Room.

7.2 Emergency Operation of the Incoming Feeder Circuit Breakers

Switching in an emergency to open Incoming Feeder Circuit Breakers (Figure 1) may be carried out without prior consultation. The circumstances of an occurrence necessitating any emergency switching shall be reported to the Electricity North West Limited Control Engineer on completion of such switching.

On typical supplies (Figure 1), no reclosures shall be carried out without the prior agreement of the Electricity North West Limited Control Engineer.

7.3 Control and Operation of Equipment within Boundaries of Electricity North West Limited Responsibility

The Electricity North West Limited Control Engineer shall control the operation of all equipment within the boundaries of Electricity North West Limited responsibility, as defined in the agreed schedules, and shall consult with the Network Rail Electrical Control Operator before carrying out any switching operations which could affect the Network Rail supply. Confirmation of a change of system state will be logged at both Electricity North West Limited Control Room and Network Rail Electrical Control Room.

7.4 Emergency Switching at Electricity North West Limited Substations

Switching may be carried out by Electricity North West Limited staff in an emergency on equipment in substations without prior consultation with Network Rail. The circumstances of any occurrence necessitating emergency switching shall be reported to the Network Rail Electrical Control Operator on completion of such switching. Any reclosure shall be at the discretion of the Electricity North West Limited Control Engineer with due regard to the safety and security of the Electricity North West Limited system and the need to maintain continuity of supplies to Network Rail.

7.5 Operation of Network Rail Feeder Stations

The operation of the Network Rail Feeder Stations and of the electrical system fed from them is the responsibility of the Network Rail Electrical Control Operator for the area concerned.

7.6 Interconnection of the Electricity North West Limited Network through the Network Rail System

Connections between Electricity North West Limited substations through a Network Rail Power Supply system shall not be made by Network Rail without seeking the consent of the Electricity North West Limited Control Engineer, who shall advise on the practicability of the connection.

7.7 Access for Network Rail Personnel to Electricity North West Limited Substations

In the event of access to an Electricity North West Limited substation being required by Network Rail personnel, reasonable notice shall be given to the appropriate Electricity North West Limited Office during normal office hours. In an emergency, access can be arranged through the Electricity North West Limited Control Engineer.

7.8 Access for Electricity North West Limited Personnel to Network Rail Feeder Stations

If Electricity North West Limited personnel require access to a Network Rail Feeder Station, reasonable notice shall be given to the Network Rail Local Manager during normal office hours. In an emergency, access can be arranged through the Network Rail Electrical Control Operator.

8 Safety Procedures

8.1 General

Before any switching or earthing is carried out, or a Permit-To-Work or Sanction-For-Test is issued for work on apparatus which can be made live from either the Electricity North West Limited or Network Rail systems, the respective control staff shall communicate and all switching, and earthing shall be agreed between them. Such actions shall be in accordance with the Electricity North West Limited and the Network Rail Safety Rules and Instructions.

When work is to be undertaken by Electricity North West Limited or Network Rail, the apparatus shall be isolated and earthed to the instructions of the Electricity North West Limited Control Engineer or Network Rail Electrical Control Operator. All work shall be undertaken in accordance with the Schedule of Responsibility.

All details of switching, isolation and earthing instructions and operations shall be logged by the Electricity North West Limited Control Engineer and the Network Rail Electrical Control Operator. Circuit State Certificate, Permit-To-Work and Sanction-For-Test numbers, together with times and dates of issue and cancellation shall also be logged and details exchanged.

Maintenance by Electricity North West Limited and Network Rail staff shall be carried out in accordance with their respective Safety Rules and procedures.

Unless specially designed and equipped for the purpose, circuit breakers shall not be used as points of isolation for the issue of Permits-To-Work or Sanctions-For-Test.

On 25kV ac single-phase systems the Supply Return Conductor must be treated with caution even when its associated line conductor is out of service since:-

(a) it may still be carrying return current,

(b) if a fault occurs on the Network Rail system its potential may rise because it is connected to the return current busbar.

- Under certain circumstances cable sheaths and, when earthed, line conductors may also carry significant Supply Return Current.
- For those reasons, work on traction supply systems should be carried out in accordance with guidelines in Appendix B and the procedures in 8.2 and 8.3.
- Engineering Recommendation P24 "AC Traction Supplies to British Rail" contains a section entitled "Operational Safety Aspects".

All Circuit State Certificates shall be uniquely numbered.

(a) Where the certificates used has been pre-numbered it shall be the responsibility of the Electricity North West Limited Senior Authorised Person to inform the Electricity North West Limited Control Engineer and similarly the Network Rail Nominated Person to inform the Network Rail Electrical Control Operator of the Circuit State Certificate number when seeking consent to the certificate being issued.

(b) Where the Circuit State Certificates is allocated an individual number by the Electricity North West Limited Control Engineer at the time of issue this shall be notified to the Electricity North West Limited Senior Authorised Person and appended to the certificate. The Electricity North West Limited Control Engineer shall also notify the Network Rail Electrical Control Operator of the Circuit State Certificate number. The Network Rail Electrical Control Operator will suffix the number with the Electricity North West Limited initials ENWL.

After the cancellation of a Permit-To-Work, if it is required to issue a Sanction-For-Test or vice versa, then the original Circuit State Certificate must be cancelled, and a new Circuit State Certificate issued.

8.2 Procedure for the Issue and Cancellation of Electricity North West Limited 'Permits-To-Work' or 'Sanction-For-Test' where Isolation or Isolation and Earthing are Required on Network Rail Controlled Equipment

Before Electricity North West Limited issue a Permit-To-Work or Sanction-For-Test on equipment for which they are responsible, the following procedures shall be observed where isolation, or isolation and earthing are required at the Network Rail Feeder Station within the boundaries of Network Rail responsibility, as defined in the agreed schedules.

The equipment concerned at the Network Rail Feeder Station shall be isolated from all points of supply and locked off from live conductors in accordance with Network Rail procedures by the Network Rail Authorised Person.

On completion of isolation from all points of supply at both Electricity North West Limited and Network Rail locations on the equipment concerned, earthing shall be carried out as agreed between the Electricity North West Limited Control Engineer and the Network Rail Electrical Control Operator in accordance with site requirements.

Where a Permit-To-Work is to be issued, the keys controlling the points of isolation and any keys controlling the means of earthing within the boundaries of Network Rail responsibility as defined in the agreed schedules, shall be placed in a Key Safe.

Where a Sanction-For-Test is to be issued, the keys controlling the points of isolation at the Network Rail Feeder Station shall be placed in a Key Safe.

The Network Rail Nominated Person shall issue to the Electricity North West Limited Senior Authorised Person a non-interchangeable key to the Key Safe, as detailed above, together with a Circuit State Certificate, issued with the consent of the Network Rail Electrical Control Operator. The Circuit State Certificate shall detail precisely all points of isolation and earthing of the equipment. Where an Electricity North West Limited Sanction-For-Test is to be issued, the keys controlling the means of earthing shall also be handed to the Electricity North West Limited Senior Authorised Person.

The Electricity North West Limited Senior Authorised Person shall place the Network Rail key thus received, together with the keys controlling either the points of isolation and earthing devices, or the points of isolation, for which he is responsible, in a Key Safe. He shall then operate the lock of that Key Safe reserved for his use.

The Electricity North West Limited Senior Authorised Person shall issue to the person in charge of the work either:

(a) a Permit-To-Work together with a non-interchangeable key of the Electricity North West Limited Key Safe controlling the points of isolation and the means of earthing.

or

(b) a Sanction-For-Test together with a non-interchangeable key of the Electricity North West Limited Key Safe controlling the points of isolation. He shall also hand over any keys controlling the means of earthing. If the person to whom a Sanction-For-Test has been issued requires earths to be removed from and/or replaced on equipment or to operate other equipment for which the Network Rail are responsible; it shall be his responsibility to communicate with the Network Rail Nominated Person for such purpose.

The Electricity North West Limited Control Engineer shall inform the Network Rail Electrical Control Operator of any safety documentation issued in accordance with Distribution Safety Rules.

On completion of work or testing, when all Permits-To-Work or Sanctions-For-Test have been cancelled, the Electricity North West Limited Senior Authorised Person shall sign and return the Network Rail Circuit State Certificate to the Network Rail Nominated Person together with the keys issued by the Network Rail Nominated Person. The Network Rail Nominated Person shall cancel the Circuit State Certificate with the consent of the Network Rail Electrical Control Operator. The Network Rail Electrical Control Operator shall inform the Electricity North West Limited Control Engineer of such cancellation.

The Electricity North West Limited Control Engineer shall inform the Network Rail Electrical Control Operator when Permits-To-Work or Sanctions-For-Test have been cancelled. They shall then jointly arrange for earths, where necessary, to be removed and for the required switching operations to be carried out to return the feeder to service.

8.3 Procedure for the Issue and Cancellation of Network Rail Permit-To-Work ' or Sanction-For-Test ' where Isolation or Isolation and Earthing are required on Electricity North West Limited Controlled Equipment

Before Network Rail issue a Permit-To-Work or Sanction-For-Test on equipment for which they are responsible, the following procedures shall be observed where isolation or isolation and earthing are required within the Boundaries of Electricity North West Limited responsibility, as defined in the agreed schedules.

The equipment concerned within the Boundaries of Electricity North West Limited responsibility shall be isolated from all points of supply and locked off from live conductors in accordance with Electricity North West Limited procedures by the Electricity North West Limited Authorised Person.

On completion of isolation from all points of supply at both Network Rail and Electricity North West Limited locations on the equipment concerned, earthing shall be carried out as agreed between the Network Rail Electrical Control Operator and the Electricity North West Limited Control Engineer in accordance with site requirements.

Where a Permit-To-Work is to be issued, the keys controlling the points of isolation and any keys controlling the means of earthing, within the boundaries of Electricity North West Limited responsibility, as defined in the agreed schedules, shall be placed in a Key Safe.

Where a Sanction-For-Test is to be issued, the keys controlling the points of isolation within the boundaries of Electricity North West Limited responsibility, as defined in the agreed schedules, shall be placed in a Key Safe.

The Electricity North West Limited Senior Authorised Person shall issue to the Network Rail Nominated Person a non-interchangeable key to the Key Safe as detailed above, together with a Circuit State Certificate, issued in accordance with CP605 and with the consent of the Electricity North West Limited Control Engineer. The

Circuit State Certificate shall detail precisely all points of isolation and earthing of the equipment. Where a Network Rail Sanction-For-Test is to be issued, the keys controlling the means of earthing shall be handed to the Network Rail Nominated Person.

The Network Rail Nominated Person shall place the Electricity North West Limited key thus received, together with the keys controlling the points of isolation and earthing devices, or the points of isolation, for which he is responsible, in a Key Safe. He shall then operate the lock of that Key Safe reserved for his use.

The Network Rail Nominated Person shall issue to the person in charge of the work either:

(a) A Permit-To-Work together with a non-interchangeable key of the Network Rail Key Safe controlling the points of isolation and the means of earthing.

(b) A Sanction-For-Test together with a non-interchangeable key of the Network Rail Key Safe controlling the points of isolation. He shall also hand over any keys controlling the means of earthing. If the person to whom a Sanction-For-Test has been issued requires earths to be removed and/or replaced on equipment or to operate other equipment for which Electricity North West Limited are responsible, it shall be his responsibility to communicate with the Electricity North West Limited Senior Authorised Person for such purposes.

The Network Rail Electrical Control Operator shall inform the Electricity North West Limited Control Engineer of any safety documentation issued in accordance with Network Rail Line Specification RT/E/S/21067.

On completion of work or testing, when all Permits-To-Work or Sanctions-For-Test has been cancelled, the Network Rail Nominated Person shall sign and return the Electricity North West Limited Circuit State Certificate to the Electricity North West Limited Senior Authorised Person together with the keys issued by the Electricity North West Limited Senior Authorised Person. The Electricity North West Limited Senior Authorised Person shall cancel the Circuit State Certificate with the consent of the Electricity North West Limited Control Engineer. The Electricity North West Limited Control Engineer shall inform the Network Rail Electrical Control Operator of such cancellation.

The Network Rail Electrical Control Operator shall inform the Electricity North West Limited Control Engineer when all Permits-To-Work or Sanctions-For-Test have been cancelled. They shall **jointly** arrange for earths, where necessary, to be removed and for the required switching operations to be carried out to return the feeder to service.

9 Protection and Testing

9.1 Responsibility for Testing and Maintenance

The responsibility for testing and maintenance of protective gear equipment and associated control and alarm circuits on Incoming Feeder Circuit Breaker shall be as detailed in the Schedule of Responsibility to be agreed locally.

9.2 Reporting of Alarms and Indication

Alarms and indications annunciated at either a Electricity North West Limited or a Network Rail location, which are concerned with equipment providing traction supplies to Network Rail, shall be reported by the operator concerned to the Electricity North West Limited Control Engineer and/or the Network Rail Electrical Control Operator as appropriate. The Electricity North West Limited Control Engineer or the Network Rail Electrical

Control Operator shall inform each other of such alarms and indications and then take appropriate actions for the cause to be investigated. They shall also co-ordinate details of any work arising therefrom.

9.3 Work on Secondary Equipment - Protective Equipment and Multicore Cables Associated with Single Phase ac Traction Supplies

The major danger to be guarded against is the rise in earth potential between the Network Rail feeder station and the Electricity North West Limited 25kV ac isolating compound and/or the 132/25kV transforming station. Section B4 of Appendix B, whilst not purporting to deal with every situation which may arise, gives guidance for safe methods of working on secondary equipment associated with 25kV ac single phase traction supplies.

9.4 Testing of Protective Equipment

Particular problems associated with the testing of single phase ac traction supplies are detailed in section B5 of Appendix B.

10 Metering

Metering for the Railway feeders, wherever sited, shall be maintained by Network Rail's Meter Operator.

Meter readings shall be taken as arranged locally by Electricity North West Limited and Network Rail's Meter Operator.

When work on the metering is required, Network Rail shall give adequate notice of this work to Electricity North West Limited so that access can be arranged.

11 Communications

Private wire and British Telecom telephones are provided for communications between Electricity North West Limited and Network Rail Electrical Control Rooms. Telephone numbers are included in Appendix D.

12 Document Revisions

Procedural changes to this document shall be agreed by all the parties concerned prior to implementation.

Data and schedules of responsibilities applicable to Electricity North West Limited shall be agreed between the appropriate Zone of Network Rail and Electricity North West Limited and these schedules together with any amendment shall be distributed by Electricity North West Limited.

13 Documents Referenced

DOCUMENTS REFERENCED	
Engineering Recommendation G38/1	Operational procedures associated with electricity supplies for traction purposes on ac and dc electrified lines
Engineering Recommendation P24	AC traction supplies to British Rail
Distribution Safety Rules	
Network Rail Line Specification RT/E/S/21067	
CP605	System Operations

14 Keywords

Supply; 25kV; Operations; Control; Safety

Figure 1

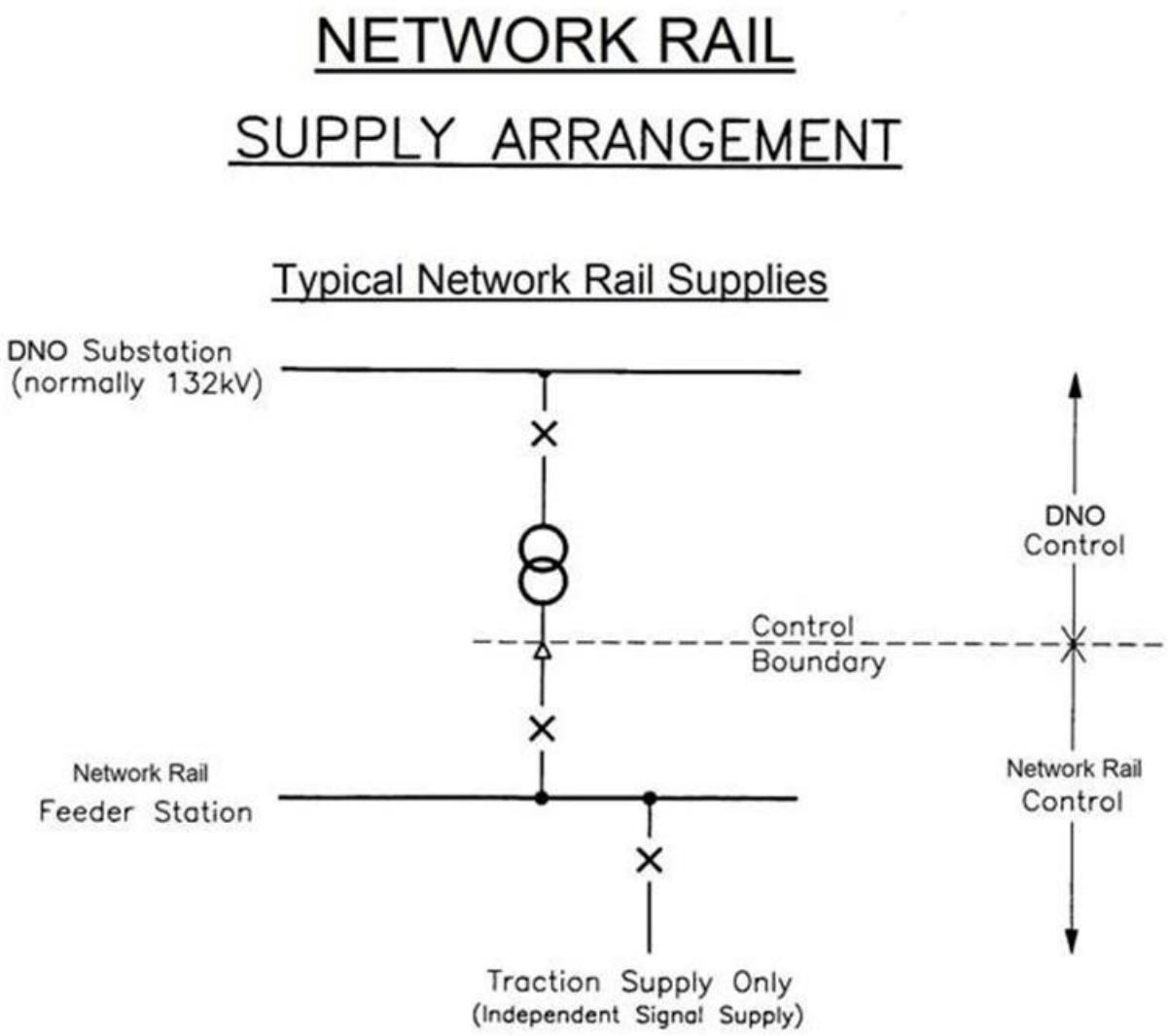

Figure 1

Appendix A – Safety Documentation

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No. _____

DISTRIBUTION PERMIT-TO-WORK

1. ISSUE To_____

The following High Voltage Apparatus has been made safe in accordance with the Distribution Safety Rules for the work detailed on this Permit-to-Work to proceed:

_____

_____

_____

TREAT ALL OTHER APPARATUS AS LIVE

Circuit Main Earth are applied at:

_____

_____

_____

_____

_____

_____

_____

_____

Other precautions and information required to be entered by Distribution Safety Rules 3.2.1(b), 4.6.2(c), 5.5.3 and 5.10.2(b) and any local instructions applicable to the work.

_____

_____

_____

_____

The following work is to be carried out:

_____

_____

_____

_____

Signed _____

Time _____ Date _____

---

2. RECEIPT

I accept responsibility for carrying out the work on the Apparatus detailed on this Permit-to-Work and no attempt will be made by me, or by the persons under my charge, to work on any other Apparatus.

Signed _____

Time _____ Date _____

---

3. TRANSFER

A Transfer Record is*/is not* associated with this Permit to Work

***Delete words not applicable**

4. CLEARANCE

All persons under my charge have been withdrawn and warned that it is no longer safe to work on the Apparatus detailed on this Permit-to-Work, and all Additional Earths have been removed.

The work is complete*/incomplete*.

All gear and tools have*/have not* been removed.

Signed _____

Time _____ Date _____

***Delete words not applicable.**

5. CANCELLATION

This Permit-to-Work is cancelled.

Signed _____

Time _____ Date _____

ENW/195/7-10

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No. _____

DISTRIBUTION SANCTION-FOR-TEST

1. ISSUE

To _____

The following High Voltage Apparatus has been made safe in accordance with the Distribution Safety Rules for the testing described on this Sanction-for-Test to proceed:

_____

_____

_____

The points of isolation are:

_____

_____

_____

_____

_____

_____

_____

_____

Circuit Main Earths are applied at:

_____

_____

_____

_____

_____

_____

_____

_____

Brief description of testing to be carried out:

_____

_____

_____

_____

Signed _____

Time _____ Date _____

---

2. RECEIPT

I accept responsibility for the testing described on this Sanction-for-Test and for taking the precautions necessary to prevent danger.

Signed _____

Time _____ Date _____

3. CLEARANCE

All persons under my charge have been withdrawn and warned that it is no longer safe to carry out testing on the Apparatus detailed on this Sanction-for-Test and all Additional Earths have been removed.

The testing is complete*/incomplete*.

All gear and tools have*/have not* been removed.

The operational state of the Apparatus is the same as at the time of issue of this Sanction-for-Test apart from the exceptions noted below:

Exceptions (if none state "none") _____

_____

_____

_____

_____

_____

Signed _____

Time _____ Date _____

***Delete words not applicable.**

4. CANCELLATION

This Sanction-for-Test is cancelled.

Signed _____

Time _____ Date _____

ENW/3732/7-10

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No. CSC _____

CIRCUIT STATE CERTIFICATE - ELECTRICITY NORTH WEST/NETWORK RAIL
THIS IS NOT A PERMIT TO WORK OR SANCTION-FOR-TEST

1. ISSUE

Issued to _____ Network Rail Nominated Person + Senior Authorised Person •

I hereby certify that at _____ Substation on

_____

_____

_____

apparatus, the following safety precautions have been carried out.

Points of Isolation _____

_____

_____

_____

Points of Earthing _____

_____

_____

_____

Issued with the consent of _____ Electricity North West Control Engineer + Electrical Control Operator •

Time _____ hours Date _____

1A. (TO BE COMPLETED BEFORE PERMITS-TO-WORK ARE ISSUED)

The points of isolation will not be interfered with and earths will not be moved until this Certificate is cancelled and permission is obtained from the Electricity North West Control Engineer + Electrical Control Operator •

Signed _____ being a Senior Authorised Person + Network Rail Nominated Person •

Time _____ hours Date _____

1B. (TO BE COMPLETED BEFORE A SANCTION-FOR-TEST IS ISSUED)

The points of isolation will not be interfered with but the earth connection may be removed temporarily but only under the personal supervision of a Senior Authorised Person + Network Rail Nominated Person •

Signed _____ being a Senior Authorised Person + Network Rail Nominated Person •

Time _____ hours Date _____

2. RECEIPT

I hereby acknowledge receipt of this Certificate and key safe key No. _____

Signed _____ being a Network Rail Nominated Person + Senior Authorised Person •

Time _____ hours Date _____

3. RETURN

3A. (TO BE COMPLETED ONLY AFTER RELEVANT PERMITS-TO-WORK HAVE BEEN CANCELLED)

I hereby declare that it is now safe for this Certificate to be cancelled.

Signed _____ being a Network Rail Nominated Person + Senior Authorised Person •

Time _____ hours Date _____

3B. (TO BE COMPLETED ONLY AFTER RELEVANT SANCTION-FOR-TEST HAVE BEEN CANCELLED)

Points of earthing are as detailed opposite with the following exceptions:-

_____

_____

_____

I hereby declare that it is now safe for this Certificate to be cancelled.

Signed _____ being a Network Rail Nominated Person + Senior Authorised Person •

Time _____ hours Date _____

4. CANCELLATION

I hereby declare that this Certificate is now cancelled.

Signed _____ being a Senior Authorised Person + Network Rail Nominated Person •

with the consent of _____ Electricity North West Control Engineer + Electrical Control Operator •

Time _____ hours Date _____

• Delete when issued by ELECTRICITY NORTH WEST
+ Delete when issued by Network Rail

When a P-T-W is being issued sub-sections 1B and 3B should be crossed out
When a S-F-T is being issued sub-sections 1A and 3A should be crossed out

ENW/CIRCUIT/PF/11-10

NETWORK RAIL: PERMIT TO WORK FOR HIGH VOLTAGE EQUIPMENT **21067/P/1**

SERIAL NO. .....
Certificate - (White Paper)

1. ISSUE

To ..... of .....

I hereby declare that it is safe to work on the following h.v. equipment, which is dead, isolated from all live conductors and is connected to earth:

.....

.....

.....

.....

.....

All other apparatus is Dangerous.

Circuit State Certificates have been received as specified below:

Serial No. ..... Circuits covered: .....

Serial No. ..... Circuits covered: .....

The equipment is isolated as specified below:

..... has ..... at .....

..... has ..... at .....

..... has ..... at .....

..... has ..... at .....

I have ..... at .....

The equipment is efficiently connected to earth:

at ..... by .....

at ..... by .....

at ..... by .....

at ..... by .....

at ..... by me

The following is the work is to be carried out on the equipment: .....

.....

.....

Danger Notices are posted at: .....

.....

.....

Signed ..... of ..... (Nominated Person)

Time .....hours Date .....

2. RECEIPT

I hereby declare that I accept responsibility for carrying out the work on the equipment detailed on this Permit and that no attempt will be made by me, or by those under my control, to carry out the work on any other equipment.

Signed ..... of .....

Time .....hours Date .....

3. TRANSFER

I have handed over my responsibility under this Permit to: .....

Signed .....

I hereby declare that I accept responsibility for carrying out the work on the equipment detailed on this Permit and that no attempt will be made by me, or by those under my control, to carry out the work on any other equipment.

Signed ..... of .....

In the presence of: ..... of .....(Nominated Person)

Time .....hours Date .....

4. CLEARANCE CERTIFICATE

I hereby declare that work on the equipment for which this Permit was issued has been *suspended/completed and that all persons under my charge have been withdrawn and warned that it is no longer safe to work on the equipment specified on this Permit and that all gear, tools and any earthing connections fixed by me or persons under my charge have been removed clear of the equipment.

Signed ..... of .....

Time ..... hours Date .....

* Delete word not applicable

5. CANCELLATION

This Permit to Work is hereby cancelled.

Signed ..... of ..... (Nominated Person)

Time .....hours Date .....

NETWORK RAIL: SANCTION FOR TEST
FOR HIGH VOLTAGE EQUIPMENT **21067/S Issue 2.**

1. ISSUE

To ..... of .....

For the following testing to be carried out: .....

.....

.....

I hereby declare that the equipment listed below has been isolated from the remainder of the system for the purposes of testing:

.....

.....

.....

.....

.....

Circuit State Certificates have been received as specified below:

Serial No. ..... Circuits covered: .....

Serial No. ..... Circuits covered: .....

The equipment is isolated as specified below:

..... has ..... at .....

..... has ..... at .....

..... has ..... at .....

..... has ..... at .....

I have ..... at .....

The equipment is efficiently connected to earth:

at ..... by .....

at ..... by .....

at ..... by .....

at ..... by .....

at ..... by .....

at .....
by me

These connections may be removed temporarily without reference to the Level A person.

SERIAL NO. .....
Certificate - (Pink Paper)

Danger Notices are posted at:

.....

.....

.....

.....

Sanction is hereby given for the above testing to proceed.

Signed ..... of ..... (Level A person)

Time .....hours Date .....

2. RECEIPT

I hereby declare that I am personally responsible for taking the necessary safety precautions to avoid danger.

Signed ..... of .....

Time ..... hours Date .....

3. CLEARANCE CERTIFICATE

I hereby declare that the testing for which this Sanction was issued is now *suspended/completed and that all persons under my charge have been withdrawn and warned that it is no longer safe to work on the equipment specified on this Sanction and that all gear and tools have been removed clear of the equipment which is earthed at the following points:

.....

.....

.....

.....

.....

Signed ..... of .....

Time ..... hours Date .....

* Delete word not applicable

4. CANCELLATION

This Sanction for Testing is hereby cancelled.

Signed ..... of ..... (Level A person)

Time ..... hours Date .....

NETWORK RAIL/ELECTRICITY COMPANY: **21067/C/1**
CIRCUIT STATE CERTIFICATE FOR HIGH VOLTAGE EQUIPMENT

THIS IS NOT A PERMIT TO WORK OR SANCTION FOR TEST

1. ISSUE

Issued to ..... [Network Rail Nominated Person *] Senior Authorised Person

I hereby certify that at ..... Substation on

.....

.....

equipment, the following safety precautions have been carried out:

Points of isolation .....

.....

.....

.....

Points of earthing .....

.....

.....

.....

Issued with the consent of ..... [E.C. Control Engineer *] Electrical Control Operator

Time ..... hours Date .....

1A. (To be completed before Permits to Work are issued)

The points of isolation will not be interfered with and earths will not be moved until this Certificate is cancelled and permission is obtained from the [E.C. Control Engineer *] Electrical Control Operator

Signed ..... being a [Senior Authorised Person *] Network Rail Nominated Person

Time ..... hours Date .....

1B. (To be completed before a Sanctions for Test is issued)

The points of isolation will not be interfered with but the earth connections may be removed temporarily but only under the personal supervision of a [Senior Authorised Person *] Network Rail Nominated Person

Signed ..... being a [Senior Authorised Person *] Network Rail Nominated Person

Time ..... hours Date .....

SERIAL NO. CSC. .....
Certificate - (Yellow Paper)

2. RECEIPT

I hereby acknowledge receipt of this certificate and key safe No. .....

Signed ..... being a [Network Rail Nominated Person *] Senior Authorised Person

Time ..... hours Date .....

3. RETURN

3A. (To be completed only after relevant Permits to Work have been cancelled)

I hereby declare that it is safe for this certificate to be cancelled.

Signed ..... being a [Network Rail Nominated Person *] Senior Authorised Person

Time ..... hours Date .....

3B. (To be completed only after relevant Sanction for Test has been cancelled)

Points of earthing are as detailed opposite with the following exceptions:

.....

.....

.....

I hereby declare that it is safe for this certificate to be cancelled.

Signed ..... being a [Network Rail Nominated Person *] Senior Authorised Person

Time ..... hours Date .....

4. CANCELLATION

I hereby declare that this certificate is now cancelled

Signed ..... being a [Network Rail Nominated Person *] Senior Authorised Person

[E.C. Control Engineer *]

Issued with the consent of ..... Electrical Control Operator

Time ..... hours Date .....

* Delete black type when issued by Electricity Company.
[Delete red type when issued by Network Rail.]
When used internally within Network Rail or between Network Rail and other companies not party to G38/1 the black type shall be amended or deleted as found necessary.

EC/CSC

Appendix B – Operational Safety Aspects Associated with Work on 25kV ac Supplies to Network Rail from the Electricity North West Limited System

B1 Introduction

B1.1 General

The problems associated with 25kV single phase traction supplies are summarised in Section 8.1 of the main document. As a consequence, procedures and limitations are required for work on the various items of 25kV plant and staff who work on this equipment should be aware of the peculiarities of this single phase system.

There are variations in the type of 25kV plant making up traction supply points throughout Electricity North West Limited and these procedures and limitations endeavour to ensure that the system of working employed at the various Electricity North West Limited traction supply points takes into account the problems arising from supply return current and transferred potential. They do not detail all the switching, isolating and earthing measures necessary for the issue of Safety Documents since these are dealt with in Section 8 and by Electricity North West Limited and Network Rail Safety Rules.

Diagrams 1a, 1b, 2a, 2b, 3a and 3b show schematically the various types of traction supply point within Electricity North West Limited. Attention is drawn to the earthing arrangements. All similarly numbered earth points are at the same potential. However, E1, E2, E3 etc can be at different potential, giving rise to a flow of currents between the various earth points.

(Engineering Recommendation P24 Section 11.4.3 explains in detail, with reasons, the means of earthing in a Electricity North West Limited isolating compound adjacent to a Network Rail Feeder Station.)

Disconnector 1L3 (2L3) allows work to be carried out on the Transformer side of it without involving Network Rail in isolation and therefore exchange of Circuit State Certificates. It should be noted that because of the magnetic bolt interlock on 1L3 (2L3) Network Rail must be requested to open the incoming VCB at their trackside feeder station before 1L3 (2L3) can be opened.

Similarly the roof top disconnectors on Network Rail trackside feeder stations are provided so that they can be used as points of isolation by Network Rail.

B1.2 Interlocking

B1.2.1 Sites where the 25kV isolating compound and 132kV Transforming Substation are on same site (Edgeley, Catterall)

1L3 (2L3) has a magnetic bolt interlock with 25kV Trackside incoming feeder CB.

Operation of 1L3 (2L3) will also require a key that will be released when the 132kV Disconnector 113 (213) is opened.

B1.2.2 Sites where the 25kV isolating compound is remote from 132kV Transforming Station (Penrith, Parkside)

1L3 (2L3) has a magnetic bolt interlock with 25kV Trackside incoming feeder CB.

At Parkside (where the distance between the 132kV substation and the 25kV Isolating Compound is greater than 1km).

There is no interlocking between the 25kV isolating compound and the 132kV substation. At the 132kV substation to operate 1T3 (2T3) requires the release of a key from 25kV Breaker 1T0B (2T0B). The key is released by opening 1T0B (2T0B).

The key required to operate 1T0B (2T0B) is released when 1T3 (2T3) is either fully open or fully closed. 1T0B (2T0B) can therefore be operated when 1T3 (2T3) is either open or closed.

At Penrith (Distance between 132kV substation and 25kV Isolating Compound - as at Parkside).

There is no interlocking between the 25kV Isolating Compound and the 132kV Substation.

To operate 1T3 (2T3) requires a key that will be released when the 132kV Disconnector 113 (213) is operated.

B1.2.3 Sites with no isolating compound adjacent to Network Rail Feeder Station

At Moss Nook / Heald Green

There is no interlock provision between 2T3A and the feeder station disconnector (2L3)

To operate 2T3A, requires a key, which will be released when the Grid 2A circuit breaker is opened.

Interlocking of the 25kV earth switches has not been detailed but they are interlocked with their own isolator. 2T1A is also interlocked with the 132kV disconnector 213A.

B2 Procedures and Limitations – (where there is an isolating compound adjacent to the network rail feeder station)

B2.1 Transforming and Isolating Compounds on Same Site (Catterall, Edgeley) - See Diagram 1a, 1b

B2.1.1 Work on equipment on the transformer side of 25kV Disconnector 1L3

(No CS Certificate required from Network Rail)

(a) Open 1L3 (2L3) - This will require the opening of 25kV Trackside incoming feeder CB and opening of 132kV isolator 113 (213).

(b) Leave earth switch 1L1B (2L1B) open.

(c) Close earth switch 1L1A (2L1A) or apply portable earthing leads connected to E2 to phase and return on transformer side of 1L3 (2L3).

No work on 1L3 (2L3) and associated earth switches would be permitted under these conditions.

B2.1.2 Work on Network Rail Busbar/CB Chamber

- At Edgeley open 1L3 - this will require the opening of the 25kV trackside incoming feeder CB and 132kV Disconnector 113.
- At Catterall open R/RX/F1/I (R/RB/F2/I) - this will require the opening of the 25kV trackside incoming feeder CB R/RX/F1 (R/RB/F2).
- At Catterall - apply portable earths to the phase conductor on the feeder station side of R/RX/F1/I (R/RB/F2/I) - connected to E1.

- At Edgeley - Close earth switch 1L1B and apply portable earths, connected to E1, to the phase conductor, on the 1L3 side of L/HF-F1.

At Catterall providing 1L1B (2L1B) is not closed, Electricity North West Limited may also carry out work on Transformer side of 1L3 (2L3) as in B2.1.1.

Note: There is no roof top Disconnector on the 132kV Substation side of L/HF-F1 at Edgeley.

At Edgeley a CS Certificate will be required from Electricity North West Limited.

B2.1.3 Work on Transformer Disconnector 1L3 (2L3) and associated earth switches 1L1A (2L1A) and 1L1B (2L1B)

(a) Open 1L3 - this will require the opening of 25kV trackside incoming feeder CB and 132kV Disconnector 113 (213).

(b) (i) At Catterall - Open R/RX/F1/I (R/RB/F2/I)

(ii) At Edgeley - Open isolator on L/HF-F1.

This will be point of isolation on Network Rail side.

(c) Close earth switches 1L1A (2L1A) and 1L1B (2L1B).

(d) Apply earthing leads, to phase and return, connected to E2, to transformer side of 1L1A (2L1A) and to the feeder station side of 1L1B (2L1B).

No work on the 25kV system between 1L3 (2L3) and the Network Rail feeder station would be permitted.

(For work on such plant see B2.1.4, B2.1.5.)

B2.1.4 Work on Roof top Disconnector and Roof top Equipment on 25kV Connection between 1L3 (2L3) and Roof top Disconnector (Catterall)

(See Note at end of Section)

(a) Open 1L3 (2L3) - (This requires the opening of the 25kV Trackside incoming feeder CB and the 132kV Disconnector 113 (213)).

(b) Open R/RX/F1/I (R/RB/F2/I).

(c) Isolate the section of 25kV Busbar at the BS breaker and at all outgoing circuits.

(d) Close earth switch 1L1B (2L1B) and apply portable earthing leads, connected to E1, adjacent to the spigot on 1L3 (2L3) side of the Roof top Disconnector.

(e) Earth the 25kV busbar through the bus section breakers and apply portable earthing leads to all circuit breaker roof bushings including that of incoming 25kV feeder circuit.

B2.1.5 Work on 25kV Connection between 1L3 and Roof top Bushing/Roof top Equipment at Network Rail Feeder Station (Edgeley)

(a) Open 1L3 - this requires the opening of the 25kV Trackside incoming feeder CB and the 132kV Disconnector 113.

(b) Open isolator on L/HF-F1 (the VCB L/HF-F1 having been previously opened).

(c) Isolate the 25kV busbar.

(d) Close isolator on L/HF-F1 to earth (E1).

(e) Close L/HF-F1.

(f) Close earth switch 1L1B.

(g) Apply portable earths (returned to E1) to the rooftop bushing on L/HF-F1 and to all other roof top bushings.

Note: Whilst the work in B2.1.4.1 or B2.1.4.2 is in progress work would be prohibited on:

- The supply return conductor between 1L3 (2L3) and the return current busbar since this connection is needed to ensure that there is no appreciable voltage difference across the roof top Disconnector and/or across the 25kV connection between the roof top Disconnector/bushing and 1L3 (2L3).

- 1L3 (2L3), 1L1A (2L1A), 1L1B (2L1B) and on the circuit between 1L3 (2L3) and the 132/25kV transformer since this would require the closure of 1L1A (2L1A) thereby forming an alternative path for the passage of return current to the transformer still in service. (This does not apply to Edgeley.)

B2.1.6 Work on or Removal of supply return conductor between 1L3 (2L3) and the return current busbar

(a) Isolate 25kV Busbars at all incoming and outgoing circuits.

(b) Open 1L3 and 2L3. This will require the opening of 132kV isolators 113, 213. (The trackside incoming feeder CBs will already have been opened.)

(c) Open roof top disconnectors R/RX/F1/I, R/RB/F2/I at Catterall (Open isolator on L/HF-F1 at Edgeley.)

(d) Close 1L1B and 2L1B.

At Catterall apply portable earthing leads to the spigot on 1L3 (2L3) side of roof top Disconnector, connected to E1.

At Edgeley close isolator on L/HF-F1 to earth (E1) then close L/HF-F1.

Whilst this situation exists work is prohibited on 25kV conductor between 1L3 (2L3) and roof top Disconnector (or Bushing) since this conductor is needed to ensure there is no appreciable voltage difference between the two ends of the supply return conductor at the moment when disconnection is being made.

B2.2 Transforming Point and Isolating Compounds on Different sites (Parkside, Penrith) - See Diagrams 2a,2b

B2.2.1 Work on equipment on Transformer side of Disconnector 1T3 (2T3)

(a) Open 1T3 (2T3) -

(i) At Penrith this requires the opening of the 132kV Disconnector/CB.

(ii) At Parkside this requires the opening of 25kV Breaker 1T0B (2T0B). (See Interlocking B1.2).

(b) Leave earth switch 1L1 (2L1) open.

(c) Apply portable earthing leads, to phase and return, connected to E3, to transformer side of 1T3.

B2.2.2 Work on transformer Disconnector 1T3 (2T3) and associated earth switch 1L1 (2L1)

(a) Open 1T3 (2T3)

(i) At Penrith this requires the opening of the 132kV Disconnector/CB.

(ii) At Parkside this also requires the opening of the 25kV Breaker 1T0B (2T0B). (See Interlocking B1.2).

(b) Open 1L3 (2L3)

(i) This requires the opening of the 25kV Trackside incoming feeder CB. (See Interlocking B1.2).

(c) Close earth switches 1L1 (2L1) and 1L1A (2L1A)

(d) Apply portable earthing leads, to phase and return on transformer side of 1T3 (2T3) and to Network Rail side of 1L1 (2L1) - connected to E3.

Earth switch 1L1B (2L1B) is left open since its closure would form a parallel path for the passage of traction return current to the transformer remaining in service via 1L1A (2L1A) and 1L1 (2L1) which is the equipment being worked upon.

Work on equipment on the Transformer side of 1T3 could also be undertaken.

B2.2.3 Work on 25kV Circuit between 1T3/1L1 (2T3/2L1) and 1L3/1L1A (2L3/2L1A)

(a) Open 1T3 (2T3).

(i) At Penrith this requires the opening of the 132kV Disconnector/CB.

(ii) At Parkside this requires the opening of the 25kV breaker 1T0B (2T0B).

(b) Open 1L3 (2L3)

(i) This requires the opening of the 25kV trackside incoming feeder CB.

(c) Close earth switches 1L1 (2L1) and 1L1A (2L1A).

(d) Leave earth switch 1L1B (2L1B) open.

Under these conditions no work is permitted on 1L3 (2L3) or on the feeder station side of 1L3 (2L3) since this would require the closure of 1L1B (2L1B) which would form a parallel path for the passage of traction return current to the transformer still in service via 1L1A (2L1A), the circuit to be worked upon and 1L1 (2L1). If, during the course of the work on the 25kV circuit, conductors are to be broken, it should be noted that E2, E2a and E3 could differ in potential.

Sheath tests should be carried out in accordance with approved Electricity North West Limited Procedures.

B2.2.4 Work on Disconnector 1L3 (2L3) and associated earth switches 1L1A (2L1A) and 1L1B (2L1B)

(a) Open 1T3 (2T3).

(i) At Penrith this requires the opening of the 132kV Disconnector/CB.

(ii) At Parkside this requires the opening of the 25kV Breaker 1T0B (2T0B).

(b) Open 1L3 (2L3).

(i) This requires the opening of the 25kV Trackside incoming feeder CB.

(c) Open the roof top disconnector(s) on the circuit(s) to be worked on, at the Network Rail Feeder Station.

(d) Leave earth switch 1L1 (2L1) open.

(e) Apply portable earthing leads, to phase and return, connected to E2, to the transformer side of 1L1A (2L1A) and to the feeder station side of 1L1B (2L1B).

Under these conditions, no work would be permitted on any part of the 25kV circuit between 1L3 (2L3) and 1T3 (2T3) for the following reasons:

(i) Should a fault occur on Network Rail's 25kV traction system, the return current busbar would rise in potential. The closed earth switches 1L1A (2L1A) and 1L1B (2L1B) or the portable earthing leads would effectively transfer some of this potential to the supply return conductor between 1L3 (2L3) and 1T3 (2T3).

(ii) If work were to be undertaken on the transformer side of 1L3 (2L3), 1L1 (2L1) would have to be closed or portable earthing leads applied in the transforming substation. These, together with the closed earthing switches 1L1A (2L1A) and 1L1B (2L1B) would form a path for the passage of traction return current. In any event, where the 25kV circuit is formed wholly by a metallic sheathed underground cable, a parallel path for the passage of traction return current is inevitably formed by the sheath and the closed earth switches 1L1A (2L1A) and 1L1B (2L1B).

B2.2.5 Work on Roof top Disconnectors and Roof top Equipment at Network Rail Feeder Station and/or on the 25kV conductor between 1L3 (2L3) and Roof top Disconnector

(a) Open 1L3 (2L3).

(i) This requires the opening of the 25kV trackside incoming feeder CB.

(b) Open roof top disconnector(s) on the circuit(s) to be worked on, at the Network Rail Feeder Station.

(c) Isolate the section of 25kV busbar at the BS breaker and at all outgoing circuits.

(d) Close earth switch 1L1B (2L1B) and apply portable earthing leads, connected to E1, adjacent to the spigot on the 1L3 (2L3) side of the roof top Disconnector.

(e) Earth the 25kV busbar through the BS breaker and apply portable earthing leads to all circuit breaker roof bushings including that of the incoming 25kV feeder circuit.

Limitations of work - as in B2.1.4.

B2.2.6 Work on or removal of the supply return conductor between 1L3 (2L3) and the return current busbar

(a) Isolate 25kV Busbars at all incoming and outgoing circuits.

(b) Open 1L3 and 2L3.

(i) This will require the opening of the incoming feeder 25kV trackside CB - see (a).

(c) Open Roof top Disconnectors.

(d) Close 1L1B and 2L1B.

Apply portable earthing leads, connection to E1, to the spigot on the 1L3 (2L3) side of the roof top Disconnector.

Limitation of work - as in 2.1.5.

B2.2.7 Work on Network Rail Busbar/CB Chamber (No CS Certificate required from Electricity North West Limited.)

(a) Open Rooftop Disconnector(s) associated with the section(s) being worked on - this will require the opening of the 25kV trackside incoming feeder CB(s).

(b) Apply portable earthing leads, connected to E1, to the phase conductor on the Feeder Station side of the Roof top Disconnector(s).

Note: Providing 1L1B (2L1B) is not closed Electricity North West Limited may also carry out work on the Transformer side of 1L3 (2L3) as in B2.2.1, B2.2.2, B2.2.3.

B3 Precautions for Work on 25kV Equipment in Situations where there is no Isolating Compound at the Feeder Station End (Moss Nook/Heald Green – See Diagram 3B)

B3.1 Moss Nook/Heald Green

Due to the limited earthing arrangements on Grid T2A, a CT / relay arrangement has been installed that will provide an alarm to the Network Management Hub (NMH) if the earth fault current exceed a pre-determined value. The NMH control engineer shall decide if the Network Rail supply shall be disconnected to protect the transformer / earthing arrangement from damage.

B3.1.2 Work on equipment on the transformer side of the 25kV disconnector 2T3A. (No CS certificate required from Network Rail)

(a) Open Grid 2A circuit breaker

(b) Open 2T3A

(c) Open 132kV disconnector 213A after 132kV supply to GT2A & GT2B has been switched out.

(d) Close earth switch 211A

(e) Close earth switch 2T1A and apply portable earthing leads connected to E2 to 25kV phase and return on transformer side of Grid 2A

(f) Leave earth switch 2L1 open

No work on 2T3A and associated earth switches would be permitted under these conditions.

B3.1.3 Work on the 25kV disconnector 2T3A and associated earth switches 2T1A and 2L1 (A CS certificate required from Network Rail)

(a) At Heald Green open circuit breaker HQ/HF-F1 and line isolator HQ/HF- F1/1.

(b) Open Disconnector 2L3. This will be the point of isolation at the Network Rail feeder station.

At Moss Nook

(c) Open Grid 2A circuit breaker

(d) Open disconnector 2T3A after 132kV supply to GT2A & GT2B has been switched out.

(e) Open 132kV disconnector 213A.

(f) Close earth switch 211A

(g) Close earth switches 2T1A and 2L1

(h) Apply portable earthing leads, connected to E2, to 25kV phase and return on transformer side of 2T1A and feeder station side of 2L1.

No work on the 25kV system between 2T3A and the trackside feeder station disconnector 2L3 would be permitted.

B3.1.4 Work on the Network Rail 25kV circuit between the disconnectors 2T3A and 2L3. (Network Rail will require a CS certificate required from Electricity North West)

(a) At Heald Green open circuit breaker HQ/HF-F1 and line isolator HQ/HF- F1/1.

(b) Open Disconnector 2L3. This will be the point of isolation at the Heald Green feeder station

At Moss Nook

(c) Open Grid 2A circuit breaker

(d) Open disconnector 2T3A. This will be the point of isolation at Moss Nook transforming station

(e) Close earth switch 2L1

At Heald Green

(f) Close earth switch 2L1A

(g) Apply portable earthing leads connected to E1 (Traction return earth) to 25kV phase.

B3.1.5 Work on 25kV connection between disconnector (2L3) and 25kV busbar & return conductor (No CS Certificate is required from Electricity North West Limited)

At Heald Green

(a) Open circuit breaker HQ/HF-F1

(b) Open disconnector 2L3

(c) Close earth switch 2L1B

(d) Apply portable earthing leads connected to E1 to 25kV phase and return on Electricity North West Limited side of circuit breaker HQ/HF-F1

No work on circuit breaker HQ/HF-F1 would be permitted

Feeder station busbar may still be live from an alternative feeding arrangement

B3.1.6 Work on circuit breaker HQ/HF-F1 and busbar-Network Rail side of circuit breaker HQ/HF-F1

This work will be covered by Network Rail Line Standards for maintenance of structure mounted outdoor switchgear.

B4 Work on Secondary Equipment – Protective Equipment and Multicore Cables Associated with Single Phase AC Traction Supplies

The major danger to be guarded against is the rise in earth potential between the Network Rail feeder station and the Electricity North West Limited 25kV isolating compound and/or the 132/25kV transforming station. The following paragraphs, whilst not purporting to deal with every situation which may arise, do nevertheless give guidance for safe methods of working on secondary equipment associated with 25kV single-phase traction supplies. Reference should be made to Fig B4.

Isolation plug A1 should be removed for work on the 132/25kV substation side of insulated terminal block A.

Isolation plug B1 should be removed for work on the Network Rail side of insulated terminal block B.

Isolation plugs A1 and B1 should be removed for work on insulated terminal block A.

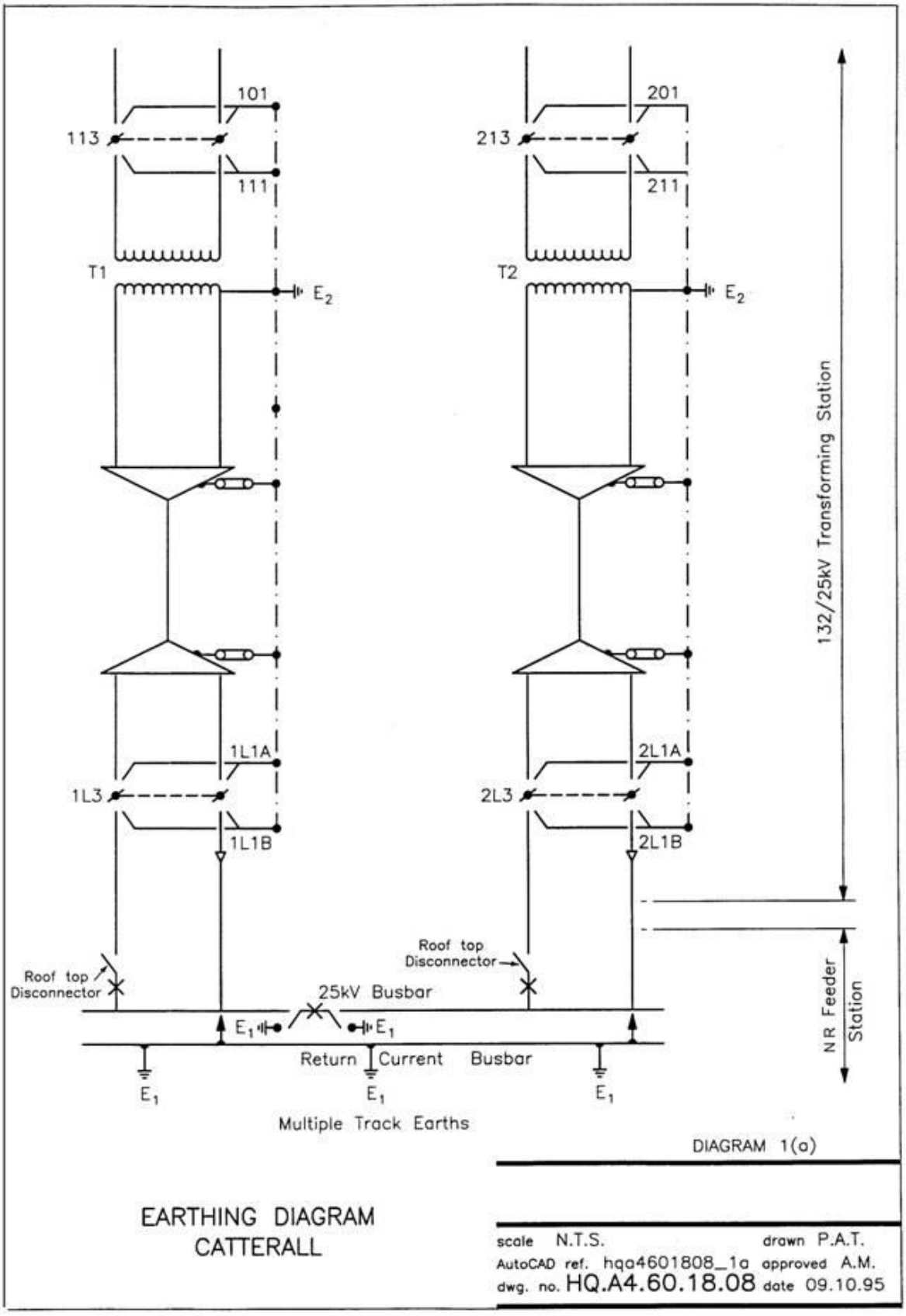
Isolation plugs A1 and B1 should also be removed for work on insulated terminal block B.

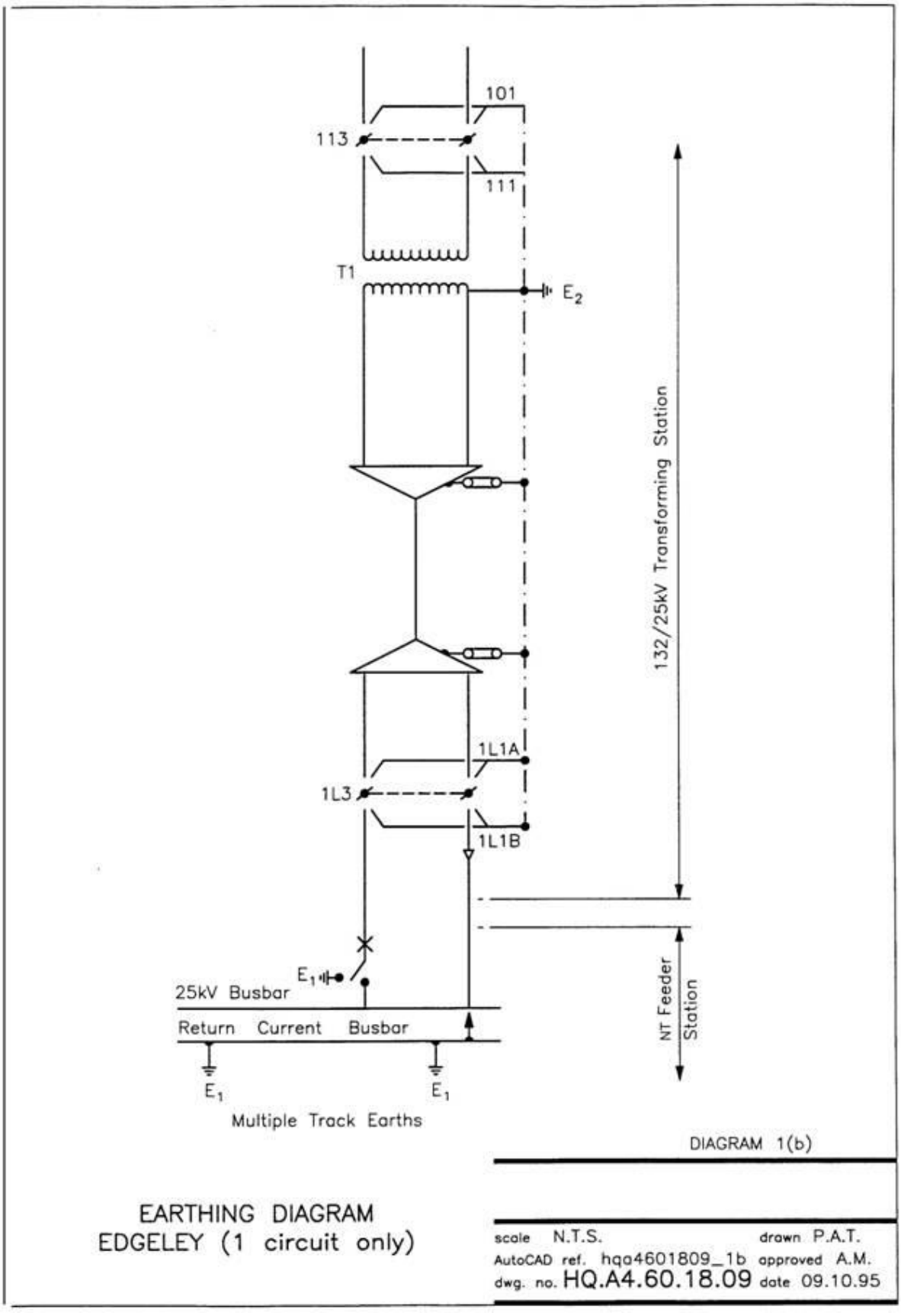
Work on multicore cables between insulated terminal blocks A and B must be undertaken in accordance with Codes or Practice for work on cables since they are subject to high voltages arising from differences in earth potential between terminal stations and/or induced voltages from adjacent circuits.

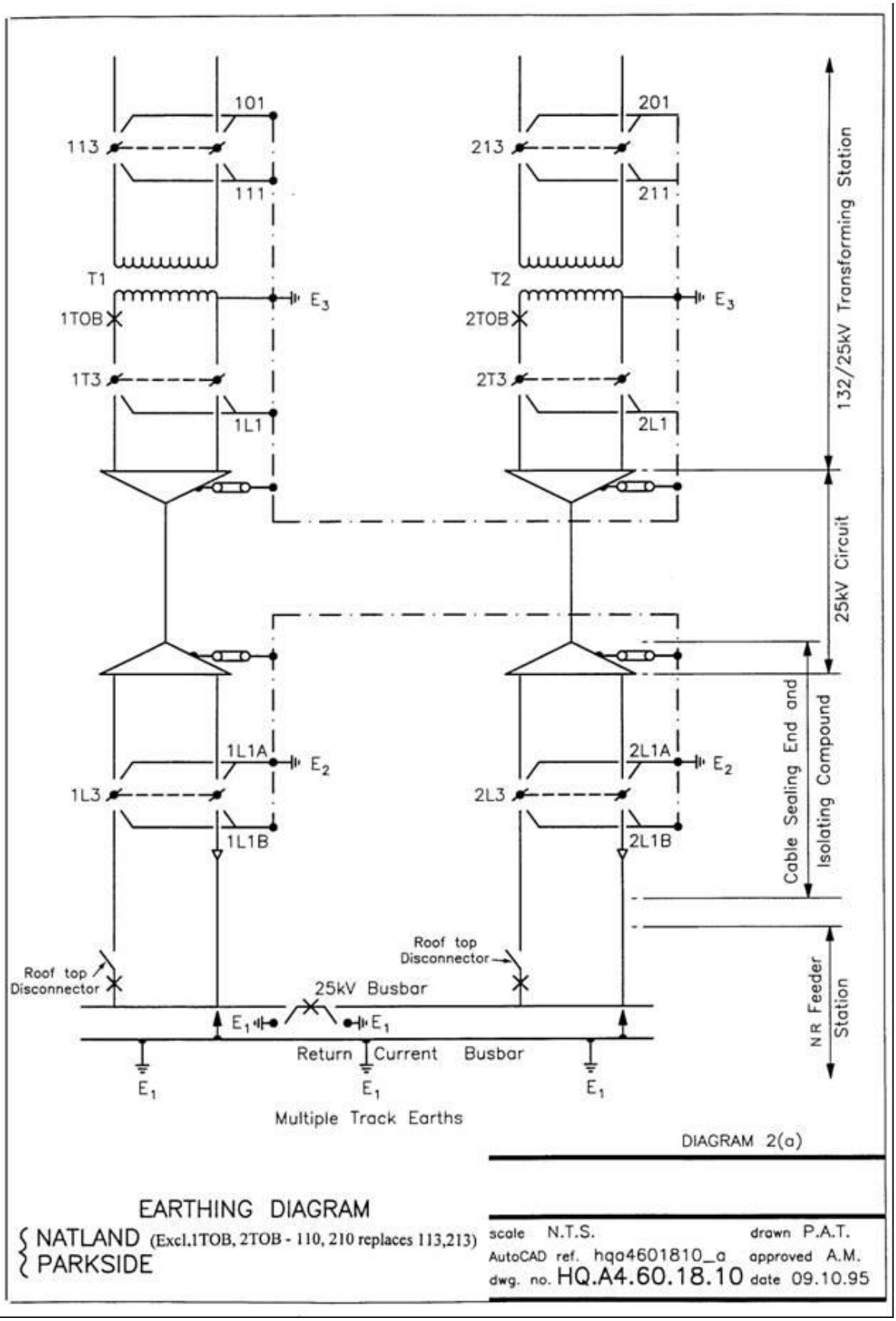
B5 Testing of Protective Equipment

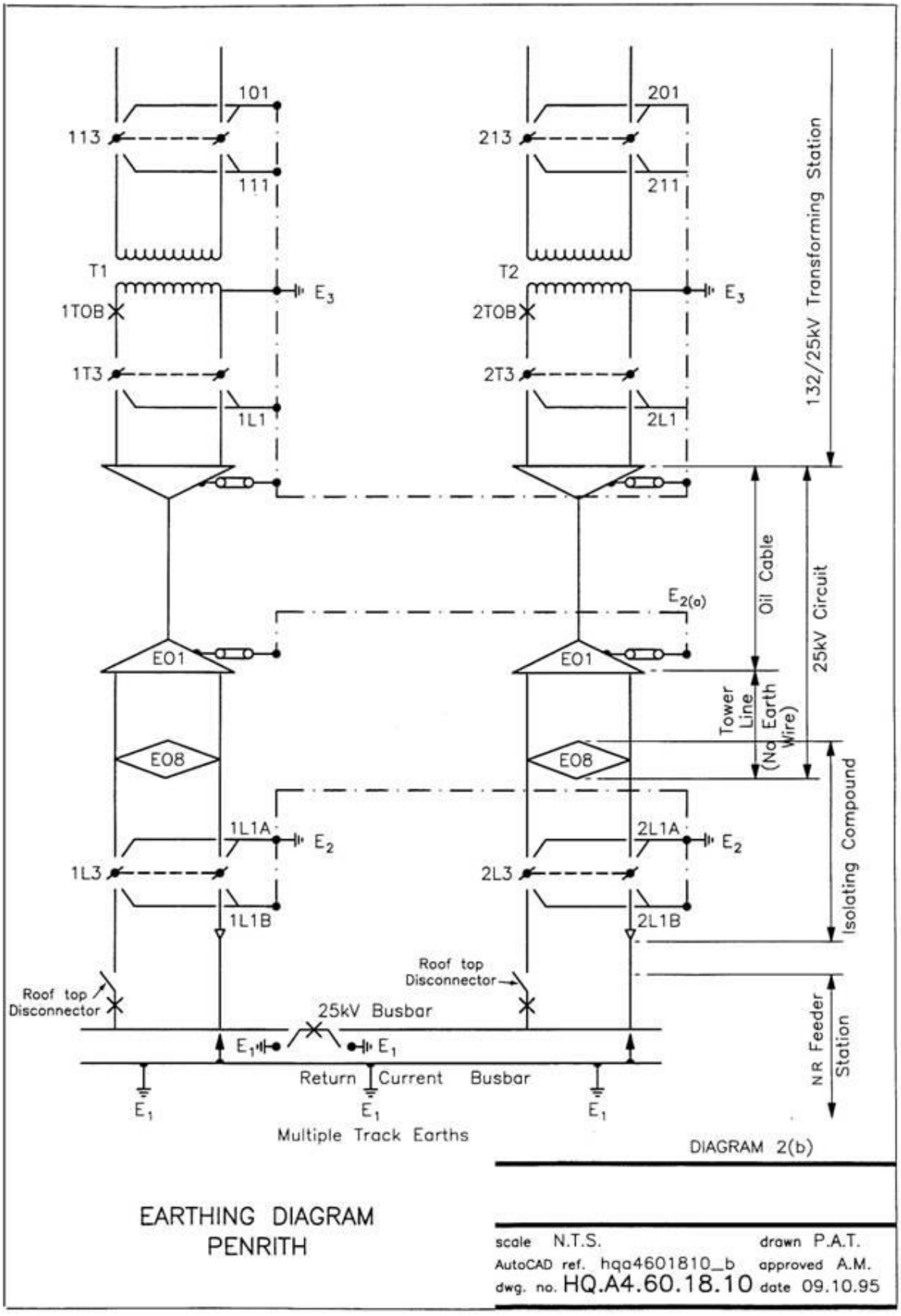
Testing of protective equipment may involve "one end" only, ie either at the 132/25kV substation or at the Network Rail feeder station. In this event, work will be undertaken observing the precautions listed in paragraph B4.

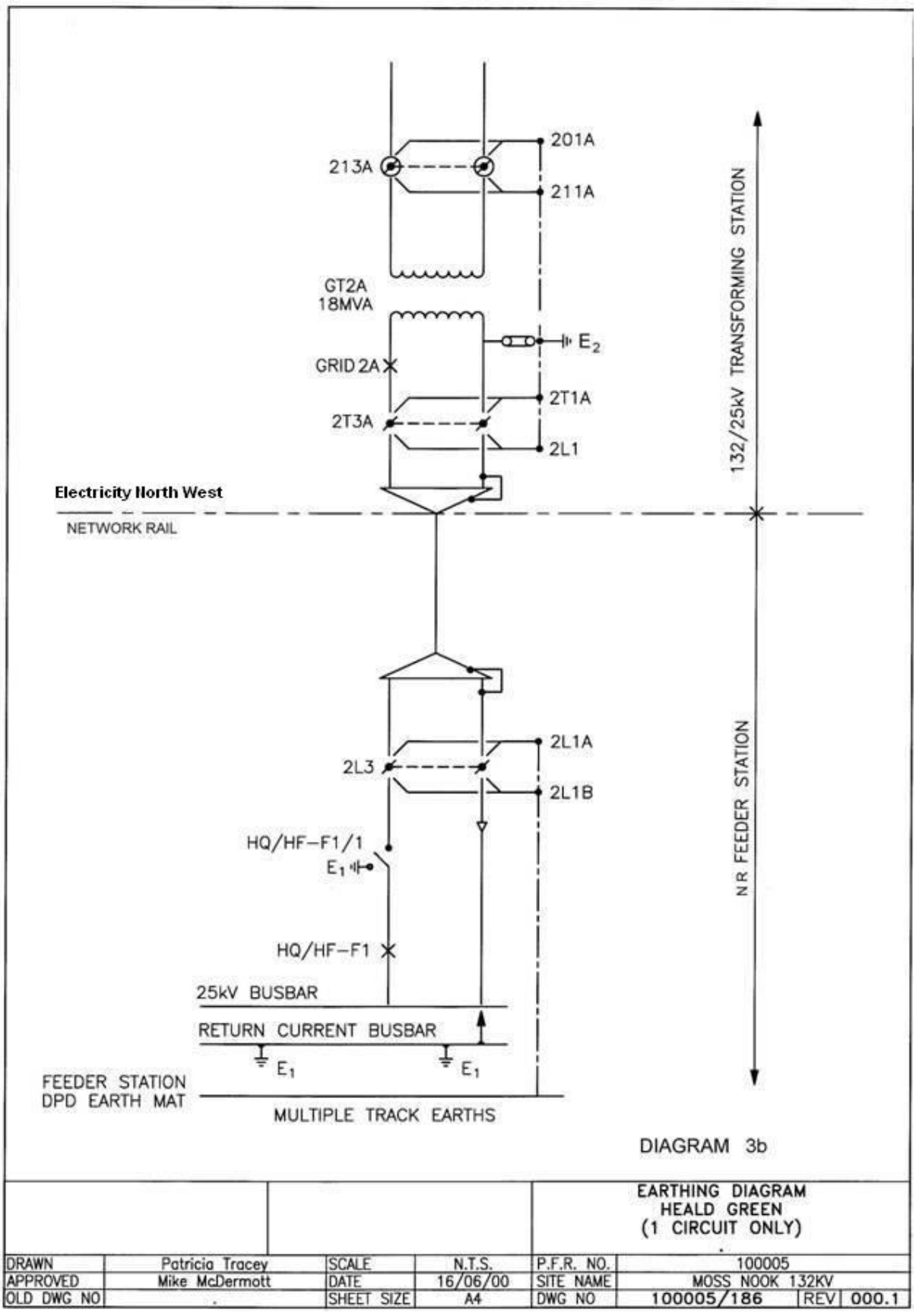
Should "end-to-end" testing be involved, ie the testing of say Translay protection, isolation plugs A1 and B1 should be withdrawn from the Translay pilots whilst the test equipment is installed, free from earth. Once installed, the isolation plugs can be replaced. The test equipment must be treated as "live" when in circuit and hence not handled. If this is not possible, approved insulating gloves must be worn. The isolation plugs must be withdrawn to dismantle the test equipment.











TYPICAL MULTICORE CABLE CIRCUIT FOR PROTECTION OF 25kV CIRCUITS

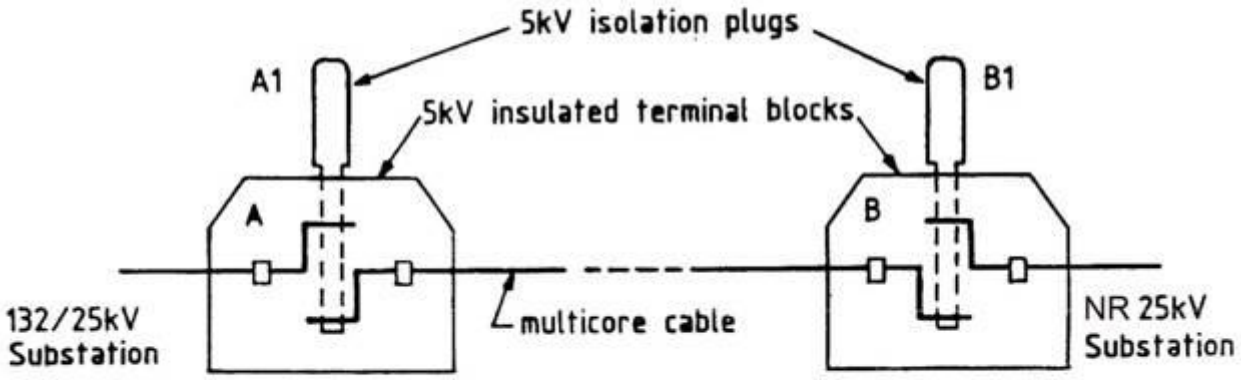


FIGURE B4

Appendix C

C1A Site Responsibility Schedule

COMPLEX **Catterall** **Schedule** **Network Rail supply**

EQUIPMENT	DESIGNATION	PARTY RESPONSIBLE FOR SAFETY	CONTROL ENGINEER	PARTY INVOLVED IN :-		SAFETY DOCUMENTS			RECLOSURE FOLLOWING FAULT	MAINTENANCE		PROVISIONAL OWNNERSHIP	FAULT INVESTGN.	NOTES
				Opening and Closing	Isolation and Earthing	Issued by	With the Consent of	Persons to be informed		Main Equipment	Control Protectn. Metering			
132kV connections between 132kV line & Grid T1 & Grid T2	Grid T1 & Grid T2 HV circuits	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
132kV Earth Switches	101, 111, 201, 211	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-			
132kV Auto-trip Disconnectors	113 & 213	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
132kV Fault Throwers	FT1 & FT2	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
Grid T1 and Grid T2 18MVA 132/25kV Single Phase T/F's	Grid T1 & Grid T2	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV connections (including earth link) between Grid T1, Grid T2 and cable sealing end	Grid T1 & Grid T2 LV Circuits	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW		
25kV Concentric cable & cable sealing ends	Grid T1 & Grid T2 Network Rail Feeder ccts.	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV connections (including VT) between cable sealing ends and 1L3 & 2L3	Grid T1 & Grid T2 Network Rail Feeder ccts.	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV Earth Switches	1L1A & 2L1A	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
25kV Disconnectors	1L3 & 2L3	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Earth Switches	1L1B & 2L1B	ENW	ENW CE	ENW	ENW	ENW	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1
					(Para 6.1.1)	(Para 6.2)								& 6.2
25kV Overhead connections between R/RX/F1/I & 1L3 and between R/RB/F2/I & 2L3	Grid T1 & Grid T2 Network Rail Feeder ccts.	ENW	ENW CE	-	ENW & NRNP (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	ENW	ENW	ENW	See Paras 6.1.1 & 6.2
25kV VCB's and associated roof isolators	R/RX/F1 & R/RX/F1/I R/RB/F2 & R/RB/F2/I	NREE	NRECO	NRECO (Para 5.2)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	NRECO *	NREE	Protn.- ENW Rest - NREE	NR	NR	See Paras 5.2, 6.1.1 & 6.3
25kV busbars		NREE	NRECO	-	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	-	NREE	NREE	NR	NR	See Paras 6.1.1, 6.3
All other 25kV VCBS connected to 25kV Network Rail busbars	Network Rail Feeders & Bus section switches	NREE	NRECO	NRECO (Para 5.6)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	-	NRECO	NREE	NREE	NR	NR	See Paras 5.6, 6.1.1 & 6.3
Return Current busbar		NREE	NRECO	-	NRNP	NRNP	NRECO	ENW CE	-	NREE	-	NR	NR	See Paras 6.1.5, 6.3

					(Para 6.1.5)	(Para 6.3 & 6.1.5)								
Return current connections from Network Rail return current busbar to 1L3 and 2L3		ENW	ENW CE	-	ENW & NRNP (Paras 6.1.1 & 6.1.5)	ENW (Paras 6.2 & 6.1.5)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1, 6.1.5, 6.2
Tariff Metering											Meter Operator			

* ENW CE to be informed before reclosure
NREE - Network Rail Electrical Engineer
NRECO - Network Rail Control Operator
NRNP - Network Rail Nominated Person

ENW – Electricity North West
ENW CE – Electricity North West Control Engineer

C1B Site Responsibility Schedule

COMPLEX **CATTERALL** **Schedule** **PROTECTION**

Type of Protection	Remote Alarm / Indications			Function
		Location	Legend	
Grid T1 & Grid T2 circuits				
1. HV Balanced Earth Fault		ENWL NMH NRCR	Transf. Main Protection Operated Discrepancy on LV VCB	Trips the LV VCB (R/RX/F1 Or R/RB/F2) and initiates the fault throwing switch. The transformer HV discon. (113 or 213) then auto-opens.
2. LV Balanced Earth Fault		ENWL NMH NRCR	Transf. Main Protection Operated Discrepancy on LV VCB	Trips the LV VCB (R/RX/F1 Or R/RB/F2) and initiates the fault throwing switch. The transformer HV discon. (113 or 213) then auto-opens.
3. HV Overcurrent		ENWL NMH NRCR	Transf. Main Protection Operated Discrepancy on LV VCB	Trips the LV VCB (R/RX/F1 Or R/RB/F2) and initiates the fault throwing switch. The transformer HV discon. (113 or 213) then auto-opens.
4. LV Overcurrent		ENWL NMH NRCR	BR 25kV Overcurrent Discrepancy on LV VCB	Trips LV VCB (R/RX/F1 or R/RB/F2) and brings up Alarm D
5. Transf. Winding Temp.	Alarm	ENWL NMH	Winding Temp. High	Alarm only
	Trip	ENWL NMH NRCR	Transf. Backup Prot. Operated Discrepancy on LV VCB	Trips LV VCB (R/RX/F1 or R/RB/F2)
6. Transformer Buchholz	Gas	ENWL NMH	Buchholz Gas/Qualitrol Operated	Alarm only
	Surge	ENWL NMH NRCR	Transf. Main Protection Operated Discrepancy on LV VCB	Trips the LV VCB (R/RX/F1 Or R/RB/F2) and initiates the fault throwing switch. The transformer HV discon. (113 or 213) then auto-opens.
7. 25kV Under Voltage Relay		ENWL NMH NRCR	Transf. Backup Prot. Operated Discrepancy on LV VCB	Trips LV VCB (R/RX/F1 or R/RB/F2). Undervoltage protection will only operate when there is no back feed onto the 25kV busbar.
8. 25kV Trip Circuit and Protection Supply - Supervision		ENWL NMH NRCR	Protection Defective Protection Volts fail	Alarm can be initiated by:- a) loss of tripping supply to R/RX/F1 or R/RB/F2 or b)fault on trip circuit wiring c) 110v battery volts high or low
9. 25kV cable Pressure		ENWL NMH NRCR	25kV cable Pressure Low None	Alarm only - Normal Pressure: 30 psi Switchout pressure: 12 psi
10. Feed Volts high 11. Feed Volts low		ENWL NMH NRCR	Substation Volts high/low Feed volts high/low	Alarm only
12. General		ENWL NMH	The following alarms also are relevant;-	

		Main Battery Fail Main Battery Charger Fail Supervisory Charger/Battery Fail Metering VT Fail Main battery Earth Fault Alarm Supply Fail	

Note:- ENWL NMH – Electricity North West Network Management Hub.
NRCR - Network Rail Control Room
For information on Protection settings etc reference should be made to Electricity North West, Protection Systems Manager, Hartington Road, Preston, PR1 8LE

C2A Site Responsibility Schedule

COMPLEX **Edgeley** **Schedule** **Network Rail supply**

EQUIPMENT	DESIGNATION	PARTY RESPONSIBLE FOR SAFETY	CONTROL ENGINEER	PARTY INVOLVED IN :-		SAFETY DOCUMENTS			RECLOSURE FOLLOWING FAULT	MAINTENANCE		PROVISIONAL OWNNERSHIP	FAULT INVESTGN.	NOTES
				Opening and Closing	Isolation and Earthing	Issued by	With the Consent of	Persons to be informed		Main Equipment	Control Protectn. Metering			
132kV connections between cable sealing ends Grid T1	Grid T1 HV circuit	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
132kV Earth Switches	101, 111	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-			
132kV Auto-trip Disconnectors	113	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
Grid T1 18MVA 132/25kV Single Phase T/F	Grid T1	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV connections (including earth link & VT) between Grid T1 and disconnector 1L3	Grid T1 LV circuit	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW		
25kV Earth Switch	1L1A	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
25kV Disconnector	1L3	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Earth Switch	1L1B	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Overhead connections between L/LH/F1 Roof bushing and 1L3	Grid T1 Network Rail Feeder circuit	ENW	ENW CE	-	ENW & NRNP (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	ENW	ENW	ENW	See Paras 6.1.1 & 6.2
25kV VCB and associated roof bushings	L/HF/F1	NREE	NRECO	NRECO (Para 5.2)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	NRECO *	NREE	Protn.- ENW Rest - NREE	NR	NR	See Paras 5.2, 6.1.1 & 6.3
25kV busbars		NREE	NRECO	-	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	-	NREE	NREE	NR	NR	See Paras 6.1.1, 6.3
All other 25kV VCBS connected to 25kV Network Rail busbars	Network Rail Feeders	NREE	NRECO	NRECO (Para 5.6)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	-	NRECO	NREE	NREE	NR	NR	See Paras 5.6, 6.1.1 & 6.3
Return Current busbar		NREE	NRECO	-	NRNP (Para 6.1.5)	NRNP (Para 6.3 & 6.1.5)	NRECO	ENW CE	-	NREE	-	NR	NR	As above
Return current connections from Network Rail return current busbar to IL3		ENW	ENW CE	-	ENW & NRNP (Paras 6.1.1 & 6.1.5)	ENW (Paras 6.2 & 6.1.5)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1, 6.1.5, 6.2
Tariff Metering											Meter Operator			

* ENWL NMH to be informed before reclosure ENWL NMH - Electricity North West Network Management Hub.

NREE - Network Rail Electrical Engineer

NRECO - Network Rail Control Operator

NRNP - Network Rail Nominated Person

ENW – Electricity North West

ENW CE – Electricity North West Control Engineer

C2B Site Responsibility Schedule

COMPLEX **EDGELEY** **Schedule** **PROTECTION**

Type of Protection	Remote Alarms/Indications			Function
	Location		Legend	
Grid T1 & Grid T2 circuits				
1. HV Balanced Earth Fault		ENWL NMH NRCR	Edgeley Non Urgent "C" Discrepancy on LV VCB	Trips the LV VCB L/HF/F1 and initiates intertrip signal to Bredbury and Adswood. Instantaneously the T/F disconnector 113 opens automatically.
2. LV Balanced Earth Fault		ENWL NMH NRCR	Edgeley Non Urgent "C" Discrepancy on LV VCB	Trips the LV VCB L/HF/F1 and initiates intertrip signal to Bredbury and Adswood. Instantaneously the T/F disconnector 113 opens automatically.
3. HV Overcurrent		ENWL NMH NRCR	Edgeley Non Urgent "C" Discrepancy on LV VCB	Trips the LV VCB L/HF/F1 and initiates intertrip signal to Bredbury and Adswood. Instantaneously the T/F disconnector 113 opens automatically.
4. LV Overcurrent		ENWL NMH NRCR	Edgeley Non Urgent "C" Discrepancy on LV VCB	Trips LV VCB L/HF/F1
5. Transf. Winding Temp.	Alarm	ENWL NMH	Edgeley Urgent 'B'	Alarm only
	Trip	ENWL NMH NRCR	No Alarm Discrepancy on LV VCB	Trips the LV VCB L/HF/F1
6. Transformer Buchholz	Gas	ENWL NMH	Edgeley Urgent 'B'	Alarm only
	Surge	ENWL NMH NRCR	No Alarm Discrepancy on LV VCB	Trips the LV VCB L/HF/F1 and initiates intertrip signal to Bredbury and Adswood. Instantaneously the T/F disconnector 113 opens automatically.
7. 25kV Under Voltage Relay		ENWL NMH NRCR	No Alarm Discrepancy on LV VCB	Trips LV VCB L/HF/F1. Undervoltage protection will only operate when there is no back feed onto the 25kV busbar.
8. 25kV Trip Circuit and Protection Supply - Supervision		ENWL NMH NRCR	Edgeley Urgent 'B' Protection Volts fail	Alarm can be initiated by:- a) loss of tripping supply to L/HF/F1 or b) fault on trip circuit wiring c) 110v battery volts high or low
9. Feed Volts high 10. Feed Volts low		ENWL NMH NRCR	No Alarm Feed volts high/low	Alarm only There is a timer to guard against transient changes.
11. General		ENWL NMH	The following alarms also are relevant :- Alarm "A" - 50v DC Supply Fail Alarm "B" - Alarm Supply Fail 110v Battery Fail Alarm "C" - 110v Battery Earth Metering VT Supply Fail	

Note:- ENWL NMH – Electricity North West Network Management Hub.
NRCR - Network Rail Control Room

For information on Protection settings etc reference should be made to Electricity North West, Protection Systems Manager, Hartington Road, Preston, PR1 8LE

C3A Site Responsibility Schedule

COMPLEX **PARKSIDE** **Schedule** **NETWORK RAIL SUPPLY**

EQUIPMENT	DESIGNATION	PARTY RESPONSIBLE FOR SAFETY	CONTROL ENGINEER	PARTY INVOLVED IN :-		SAFETY DOCUMENTS			RECLOSURE FOLLOWING FAULT	MAINTENANCE		PROVISIONAL OWNNERSHIP	FAULT INVESTGN.	NOTES
				Opening and Closing	Isolation and Earthing	Issued by	With the Consent of	Persons to be informed		Main Equipment	Control Protectn. Metering			
132kV connections (cable on Grid T1B) between 132kV lines & Grid T1B & Grid T2B	Grid T1B & Grid T2B HV circuits	ENW	ENW CE	-	NTS	NTS	ENW CE	-	-	ENW	ENW	ENW	ENW	
132kV Earth Switches	101B, 201B,111B, 211B	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	NTS**	ENW	-	ENW	ENW	
132kV SF6 Disconnectors	115B & 215B	ENW	ENW CE	ENW * (para 5.4)	ENW	ENW	ENW CE	-	-	ENW	NTS	ENW	ENW	# Can be closed by Telecontrol
Grid T1B and Grid T2B 18MVA 132/25kV Single Phase T/F's	Grid T1B & Grid T2B	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	NTS	ENW	ENW	
25kV connections (including VT and earth link) between Grid T1B, Grid T2B and cable sealing ends	Grid T1B & Grid T2B LV Circuits	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	NTS	ENW	ENW	
25kV VCB's	1TOB & 2TOB	ENW	ENW CE	ENW (Para 5.4)	ENW	ENW	ENW CE	-	ENW *	ENW	ENW	ENW	ENW	See Para 5.4
25kV Disconnectors	1T3 & 2T3	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
	1L1 & 2L1	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
25kV Concentric cable & cable sealing ends	Grid T1B & Grid T2B Network Rail Feeder ccts.	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV connections (including VT) between cable sealing ends and 1L3 & 2L3	Grid T1 & Grid T2 Network Rail Feeder ccts.	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV Earth Switches	1L1A & 2L1A	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
25kV Disconnectors	1L3 & 2L3	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Earth Switches	1L1B & 2L1B	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Overhead connections between Z/ZX/F1/I & 1L3 and between Z/ZV/F2/I & 2L3	Grid T1B & Grid T2B Network Rail Feeder ccts.	ENW	ENW CE	-	ENW & NRNP (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	ENW	ENW	ENW	See Paras 6.1.1 & 6.2
25kV VCB's and associated roof isolators	Z/ZX/F1 & Z/ZX/F1/I Z/ZV/F2 & Z/ZV/F2/I	NREE	NRECO	NRECO (Para 5.2)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	NRECO **	NREE	Protn.- ENW Rest - NREE	NR	NR	See Paras 5.2, 6.1.1 & 6.3
25kV busbars		NREE	NRECO	-	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	-	NREE	NREE	NR	NR	See Paras 6.1.1, 6.3
All other 25kV VCBS connected to 25kV Network Rail busbars	Network Rail Feeders & Bus section switches	NREE	NRECO	NRECO (Para 5.6)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	-	NRECO	NREE	NREE	NR	NR	See Paras 5.6, 6.1.1 & 6.3

Return Current busbar		NREE	NRECO	-	NRNP (Para 6.1.5)	NRNP (Para 6.3 & 6.1.5)	NRECO	ENW CE	-	NREE	-	NR	NR	As above
Return current connections from Network Rail return current busbar to 1L3 and 2L3		ENW	ENW CE	-	ENW & NRNP (Paras 6.1.1 & 6.1.5)	ENW (Paras 6.2 & 6.1.5)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1, 6.1.5, 6.2

Tariff Metering											Meter Operator			

* NRECO to be informed before reclosure

** ENW CE to be informed before reclosure NREE - Network Rail Electrical Engineer NRECO - Network Rail Control Operator NRNP - Network Rail Nominated Person ENW - Electricity North West Engineer ENW CE - Electricity North West Control Engineer ENW - Electricity North West Limited

C3B Site Responsibility Schedule

COMPLEX **PARKSIDE** **Schedule** **PROTECTION**

Type of Protection	Remote Alarms/Indications			Function
		Location	Legend	
Grid T1B & Grid T2B circuits				
1. HV Balanced Earth Fault		ENWL NMH NRCR	Transf. Main Protection Operated Transf. Back-up protection Operated Discrepancy on LV VCB	Trips 1TOB and Z/ZX/F1 or 2TOB and Z/ZV/F2 and initiates an intertrip to all ends of the Bold/parkside/ Golborne 132kv circuit. The transformer HV disconnector 115B or 215B then auto-opens.
2. LV Balanced Earth Fault		ENWL NMH NRCR	Transf. Main Protection Operated Transf. Back-up protection Operated Discrepancy on LV VCB	Trips 1TOB and Z/ZX/F1 or 2TOB and Z/ZV/F2 and initiates an intertrip to all ends of the Bold/parkside/ Golborne 132kv circuit. The transformer HV disconnector 115B or 215B then auto-opens.
3. Stage 1 HV Overcurrent		ENWL NMH NRCR	25kV Feeder Protection Operated Discrepancy on LV VCB	Trips 1TOB and Z/ZX/F1 or 2TOB and Z/ZV/F2
4. Stage 2 Hv Overcurrent		ENWL NMH NRCR	Transf. Main Protection Operated Transf. Back-up protection Operated Discrepancy on LV VCB	Trips 1TOB and Z/ZX/F1 or 2TOB and Z/ZV/F2 and initiates an intertrip to all ends of the Bold/parkside/ Golborne 132kv circuit. The transformer HV disconnector 115B or 215B then auto-opens.
5. Translay		ENWL NMH NRCR	25kV Feeder Protection Operated Discrepancy on LV VCB	Trips 1TOB and Z/ZX/F1 or 2TOB and Z/ZV/F2
6. LV Overcurrent		ENWL NMH NRCR	Alarm 'A' or Alarm 'B' * Discrepancy on LV VCB	Trips LV VCB Z/ZX/F1 or Z/ZV/F2
7. Transf. Winding Temp.	Alarm	ENWL NMH	Winding Temp. High	Alarm only
	Trip	ENWL NMH NRCR	Alarm 'A' or Alarm 'B' * Discrepancy on LV VCB	Trips LV VCB Z/ZX/F1 or Z/ZV/F2
8. Transformer Buchholz	Gas	ENWL NMH	Buchholz Gas/Qualitrol Operated	Alarm only
	Surge	ENWL NMH NRCR	Transf. Main Protection Operated Transf. Back-up protection Operated Discrepancy on LV VCB	Trips 1TOB and Z/ZX/F1 or 2TOB and Z/ZV/F2 and initiates an intertrip to all ends of the Bold/parkside/ Golborne 132kv circuit. The transformer HV disconnector 115B or 215B then auto-opens.
9. 25kV Under Voltage Relay		ENWL NMH NRCR	Alarm 'A' or Alarm 'B' * Discrepancy on LV VCB	Trips LV VCB Z/ZX/F1 or Z/ZV/F2. Undervoltage protection will only operate when there is no back feed onto the 25kV busbar.
10.132kV Cable pressure		ENWL NMH NRCR	132kV Cable Pressure Low None	Normal pressure - 29psi Alarm pressure - 19 psi Switch out pressure - 10 psi
11. 25kV Cable Pressure		ENWL NMH NRCR	25kV Cable Pressure Low	Normal pressure - 20 psi Alarm pressure - 13 psi Switch out pressure - 10 psi
12. 25kV VCB trip circuit supervision		ENWL NMH NRCR	Trip Circuit Faulty Protection Volts fail	Alarm can be initiated by 1TOB or 2TOB Trip circuit supervision relay and protection supply supervision relay and 60v surge proof I/T supply supervision relay at Parkside 132kV substation.
13. Feed Volts high 14. Feed Volts low		ENWL NMH NRCR	Substation Volts high/low Feed volts high/low	Alarm only
15. Low Accumulator Pressure-Disconnector 115B or 215B		ENWL NMH NRCR	SF6 Isolator fail None	Individual Alarm for 115B and 215B
16. General		ENWL NMH	The following alarms also are relevant;- Main Battery Charge Fail Supervisory Charger/Battery Fail Metering VT Fail Main battery Earth Fault SF6 Isol. Fail - (115B, 215B) Alarm Supply Fail - (GT1B, GT2B)	

Note:- ENWL NMH - Electricity North West Network Management Hub.
NRCR - Network Rail Control Room

* Alarm from trackside substation.
Alarm A/B is also received at ENWL NMH for the operation of :- Grid 1B/2B I/T receive

For information on Protection settings etc reference should be made to Electricity North West, Protection Systems Manager, Hartington Road, Preston, PR1 8LE

Grid 1B/2B trip circuit supervision
Grid 1B/2B Tripping relay operated

at the trackside substation.

C4A Site Responsibility Schedule

COMPLEX **PENRITH** **Schedule** **NETWORK RAIL SUPPLY**

EQUIPMENT	DESIGNATION	PARTY RESPONSIBLE FOR SAFETY	CONTROL ENGINEER	PARTY INVOLVED IN :-		SAFETY DOCUMENTS			RECLOSURE FOLLOWING FAULT	MAINTENANCE		PROVISIONAL OWNNERSHIP	FAULT INVESTGN.	NOTES
				Opening and Closing	Isolation and Earthing	Issued by	With the Consent of	Persons to be informed		Main Equipment	Control Protectn. Metering			
132kV connections (cable on Grid T1B) between 132kV lines & Grid T1B & Grid T2B	Grid T1B & Grid T2B HV circuits	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
132kV Earth Switches	111B, 211B	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-			
132kV SF6 Disconnector	115B	ENW	ENW CE	ENW *	ENW	ENW	ENW CE	-	ENW **	ENW	ENW	ENW	ENW	* Can be operated by Telecontrol
132kV Auto-trip Disconnector	213B	ENW	ENW CE	ENW	ENW	ENW								
Grid T1B and Grid T2B 132/25kV Single Phase T/F's	Grid T1B (18MVA) Grid T2B (15MVA)	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV connections (including VT and earth link) between Grid T1B, Grid T2B and cable sealing ends	Grid T1B & Grid T2B LV Circuits	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV Disconnectors	1T3B & 2T3B	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
25kV Earth Switches	1L1 & 2L1	ENW	ENW CE	ENW	ENW	ENW	ENW CE	-	-	ENW	-	ENW	ENW	
25kV Concentric cable & cable sealing ends	Grid T1B & Grid T2B Network Rail Feeder ccts.	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
O/H line towers EO1 to EO8	Grid T1B & Grid T2B Network Rail Feeder ccts.	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV O/H connections from EO8 to 1L3 and 2L3	Grid T1 & Grid T2 Network Rail Feeder ccts.	ENW	ENW CE	-	ENW	ENW	ENW CE	-	-	ENW	ENW	ENW	ENW	
25kV Earth Switches	1L1A & 2L1A	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Disconnectors	1L3 & 2L3	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Earth Switches	1L1B & 2L1B	ENW	ENW CE	ENW	ENW (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1 & 6.2
25kV Overhead connections between P/PT/F1/I & 1L3 and between P/PU/F2/I & 2L3	Grid T1B & Grid T2B Network Rail Feeder ccts.	ENW	ENW CE	-	ENW & NRNP (Para 6.1.1)	ENW (Para 6.2)	ENW CE	NRECO	-	ENW	ENW	ENW	ENW	See Paras 6.1.1 & 6.2
25kV VCB's and associated roof isolators	P/PT/F1 & P/PT/F1/I P/PU/F2 & P/PU/F2/I	NREE	NRECO	NRECO (Para 5.2)	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	NRECO ***	NREE	Protn.- ENW Rest - NREE	NR	NR	See Paras 5.2, 6.1.1 & 6.3
25kV busbars		NREE	NRECO	-	NRNP (Para 6.1.1)	NRNP (Para 6.3)	NRECO	ENW CE	-	NREE	NREE	NR	NR	See Paras 6.1.1, 6.3
All other 25kV VCBS connected	Network Rail Feeders &	NREE	NRECO	NRECO	NRNP	NRNP	NRECO	-	NRECO	NREE	NREE	NR	NR	See Paras 5.6, 6.1.1

to 25kV Network Rail busbars	Bus section switches			(Para 5.6)	(Para 6.1.1)	(Para 6.3)								& 6.3
Return Current busbar		NREE	NRECO	-	NRNP (Para 6.1.5)	NRNP (Para 6.3 & 6.1.5)	NRECO	ENW CE	-	NREE	-	NR	NR	As above
Return current connections from Network Rail return current busbar to 1L3 and 2L3		ENW	ENW CE	-	ENW & NRNP (Paras 6.1.1 & 6.1.5)	ENW (Paras 6.2 & 6.1.5)	NTCE	NRECO	-	ENW	-	ENW	ENW	See Paras 6.1.1, 6.1.5, 6.2
Tariff Metering											Meter Operator			

** NRECO to be informed before reclosure
*** ENW CE to be informed before reclosure

ENW - Electricity North West Engineer Person ENW CE - Electricity North West Control Engineer ENW - Electricity North West Limited NREE - Network Rail Electrical Engineer NRECO - Network Rail Control Operator NRNP - Network Rail Nominated

C4B Site Responsibility Schedule

COMPLEX **Penrith** **Schedule** **Protection**

Type of Protection	Remote Alarms/Indications		Function
	Location	Legend	
Grid T1B & Grid T2B circuits 1. HV Balanced Earth Fault 2. LV Balanced Earth Fault 3. HV Overcurrent 4. Translay	ENWL NMH NRCR	Transf. Main Protection Operated Discrepancy on LV VCB	For GT1B - Trips LV VCB P/PT/F1 and initiates I/T signal to Penrith, Harker, and Carlisle 115B then auto -opens For GT2B - Trips LV VCB P/PU/F2 and initiates I/T signal to Penrith, Harker, Egremont, and Sellafield. 213B then auto-opens
5. LV Overcurrent	ENWL NMH NRCR	25kV circuit breaker auto-trip Discrepancy on LV VCB	Trips LV OCB (P/PT/F1 OR P/PU/F2)
6. Transf. Winding Temp.	Alarm ENWL NMH Trip ENWL NMH NRCR	Winding Temp. High Transformer Back-up prot. operated Discrepancy on LV VCB	Alarm only Trips LV OCB (P/PT/F1 OR P/PU/F2)
7. Transformer Buchholz	Gas ENWL NMH Surge ENWL NMH NRCR	Buchholz Gas/Qualitrol Operated Transf. Main Protection Operated Discrepancy on LV VCB	Alarm only As for Items (1) to (4)
8. 25kV Under Voltage Relay	ENWL NMH NRCR	Transf. Backup Prot. Operated Discrepancy on LV VCB	Trips LV VCB (P/PT/F1 or P/PU/F2). Undervoltage protection will only operate when there is no back feed onto the 25kV busbar.
9. 25kV Trip Circuit and Protection Supply - Supervision	ENWL NMH NRCR	Protection Defective Protection Volts fail	Alarm can be initiated by:- a) loss of tripping supply to P/PT/F1 or P/PU/F2 and /or b) fault on tripping circuit for these breakers
10. 132kV Cable pressure T1B	ENWL NMH NRCR	132kV Cable Pressure low No alarm	Alarm only
11. 25kV Cable Pressure	ENWL NMH NRCR	25kV cable pressure low None	Alarm only - Normal Pressure: 30 psi Switchout Pressure: 12 psi
12. Feed Volts high 13. Feed Volts low	ENWL NMH NRCR	Substation Volts high/low Feed volts high/low	Alarm only - Set to 28kV for high; 22kV for low (Software generated alarms)
14.General	ENWL NMH	Alarms are also received as follows - Main Battery Fail Main Battery Charger Fail Main Battery Earth Fault Supervisory Batt./Charger Fail Alarm supply fail Aux. Supply Fail 25kV I/T supply fail BR Alarm Supply Fail	Alarm only

Note:- ENWL NMH - Electricity North West Network Management Hub.
NRCR - Network Rail Control Room
For information on Protection settings etc reference should be made to Electricity North West, Protection Systems Manager, Hartington Road, Preston, PR1 8LE

C5A Site Responsibility Schedule

COMPLEX **Moss Nook** **Schedule** **Network Rail Supply**

Equipment	Designation	Party Responsible For Safety	Control Engineer	Opening & Closing	Isolation & Earthing	Issued By	With th Consent of :	Persons to be informed	Reclosure following fault	Main Equipment	Control Protection Metering	Ownership	Fault Investigation	Notes
132kV connections	Grid GT2A HV Circuit	ENW	ENW	ENW	ENW	ENW	ENW	_	_	ENW	ENW	ENW	ENW	
132kV Disconnector	213A	ENW	ENW	ENW	ENW	ENW	ENW			ENW	ENW	ENW	ENW	
132kV Earth Switches	201A, 211A	ENW	ENW	ENW	ENW	ENW	ENW			ENW	ENW	ENW	ENW	
18MVA 132/25kV Transformer	GT2A	ENW	ENW	ENW	ENW	ENW	ENW			ENW	ENW	ENW	ENW	
25kV Voltage Transformer		ENW	ENW	ENW	ENW	ENW	ENW			ENW	ENW	ENW	ENW	
25kV Circuit Breaker	Grid 2A	ENW	ENW	ENW	ENW para 6.1.1	ENW para 6.2	ENW			ENW	ENW	ENW	ENW	See para's 6.1.1. & 6.2
25kV Disconnector	2T3A	ENW	ENW	ENW	ENW para 6.1.1	ENW para 6.2	ENW			ENW	ENW	ENW	ENW	See para's 6.1.1. & 6.2
25kV Earth Switches	2T1A, 2L1	ENW	ENW	ENW	ENW para 6.1.1	ENW para 6.2	ENW			ENW	ENW	ENW	ENW	See para's 6.1.1. & 6.2
25kV connection to Sealing End		ENW	ENW	ENW	ENW para 6.1.1	ENW para 6.2	ENW			ENW	ENW	ENW	ENW	See para's 6.1.1. & 6.2
25kV feeder cable and pilot to trackside feeder station	Grid GT2A feeder circuit	ENW / Network Rail	ENW		ENW para 6.1.1	ENW para 6.2	ENW	NRECO		NREE	NREE	Network Rail	Network Rail	See para's 6.1.1. & 6.2
25kV Disconnector	2L3	NREE	NRECO	NRECO	ENW para 6.1.1	NRNP para 6.3	NRECO	ENW	NRECO *	NREE	NREE	Network Rail	Network Rail	See para's 6.1.1. & 6.3
25kV Earth Switches	2L1A, 2L1B	NREE	NRECO	NRECO	ENW para 6.1.1	NRNP para 6.3	NRECO	ENW	NRECO	NREE	NREE	Network Rail	Network Rail	See para's 6.1.1. & 6.3
25kV Busbars		NREE	NRECO		NRNP para 6.1.1 & 6.1.5	NRNP para 6.3	NRECO	ENW		NREE	NREE	Network Rail	Network Rail	See para's 6.1.1. & 6.1.5
Return Current Busbar		NREE	NRECO		NRNP para 6.1.1 & 6.1.5	NRNP para 6.3	NRECO	ENW		NREE		Network Rail	Network Rail	See para's 6.1.1. & 6.1.5
Return Current Connections from Network Rail feeder station		ENW / Network Rail	ENW Network Rail		ENW & NRNP para 6.1.1 & 6.1.5	ENW para 6.2	ENW	NRECO		ENW		ENW	ENW	See para's 6.1.1. , 6.2 & 6.1.5
Metering										Meter Operator				

* Electricity North West to be informed before reclosure

ENW - Electricity North West Limited

NREE Network Rail Electrical Engineer
NRECO Network Rail Control Operator
NRNP Network Rail Nominated Person

C5B Site Responsibility Schedule

COMPLEX **Moss Nook** **Schedule** **Protection**

	Protection Schemes And Remote Alarms & Indications					
Ref	**Type of Protection**	**Function**	**Ownership**	**Maintenance**	**Alarms**	**location**
1	HV Restricted Earth Fault MFAC 14	Cross trips GT2B and intertrips to South Manchester. Opens Disconnector 213A and initiates Grid 2A CB trip & GT2B Auto Reset	Electricity North West	Electricity North West	HV protection operated LV protection operated HV protection operated Transformer main protection operated	Electricity North West local Telecontrol
2	HV Overcurrent 1st Stage KCGG122 2nd Stage	Initiates Grid 2A circuit breaker trip Initiates 25kV intertrip to Network Rail CB Initiates 132kV protection trip	Electricity North West	Electricity North West	Grid T / F protection operated Transformer back up protection operated As HV restricted earth fault above Protection defective(Watchdog)	Electricity North West local Telecontrol
3	LV Restricted Earth Fault MFAC 14	As section 1	Electricity North West	Electricity North West	As section 1	As sections 1 & 2
4	LV Overcurrent KCGG122	As section 2	Electricity North West	Electricity North West	As section 2	As section 2
5	Undervoltage MVTU11	Alarm only	Electricity North West	Electricity North West	Alarm Only	
6	Protection Supply Supervision, MVAX12	Monitoring of protection tripping supply	Electricity North West	Electricity North West	Trip circuit faulty	Electricity North West local
7	Trip Circuit Supervision MVAX 31	Monitoring of tripping circuitry	Electricity North West	Electricity North West	Trip circuit faulty	Electricity North West local
8	Translay S (Phase) MBCI 01	Initiates 25kV intertrip to Network Rail CB Initiates Grid 2A circuit breaker trip	Network Rail	Network Rail/ Electricity North West	Network Rail feeder protection operated Network Rail protection operated	Electricity North West local
9	Translay S (Neutral) MBCI 01	Initiates 25kV intertrip to Network Rail CB Initiates Grid 2A circuit breaker trip	Network Rail	Network Rail/ Electricity North West	Network Rail feeder protection operated Network Rail protection operated	Electricity North West local Telecontrol
10	Inter-tripping from GT2B	As section 2 1st Stage tripping	Electricity North West	Electricity North West	As section 2 1st Stage tripping	As section 2
11	132kV Line protection from South Manchester	As section 2 1st Stage tripping	Electricity North West	Electricity North West	As section 2 1st Stage tripping	As section 2
12	Transformer Winding Temp	As section 2 1st Stage trip	Electricity North West	Electricity North West	As section 2 1st Stage trip	As section 2
13	Transformer Buchholz	As section 1	Electricity North West	Electricity North West	As section 1	As section 1
14	Transformer 25KV Definite time E/F KCGG 122	Excess E-N Current Alarm	Electricity North West	Electricity North West	Excess E-N Current	Local & Telecontrol
15	Transformer 25KV Definite time E/F KCGG 122	Excess E-N Current Trip Trips Grid 2A CB	Electricity North West	Electricity North West	Excess E-N Current Trip	Local & Telecontrol

Appendix D – Communications

Electricity North West

1. FOR OUTAGES

All Sites

System Management Planning Engineer
Electricity North West Network Management Hub
Linley House
Dickinson St.
Manchester
M4 1LF

0843 311 5046

2. CONTACT BETWEEN CONTROL ROOMS

All Sites

Senior Shift Control Engineer
Electricity North West Network Management Hub
Linley House
Dickinson St.
Manchester M1 4LF

0843 311 4820*

3. SHORT TERM OPERATIONAL CONTACT

All Sites

Senior Shift Control Engineer
Electricity North West Network Management Hub
Linley House,
Dickinson Street
Manchester M1 4LF

0843 311 4820

Network Rail

All Sites

Duty Controller
Crewe Electrical Control Room
International Electrical Maintenance Dept.
Wistaston Rd.
Crewe
CW2 7RL

01270 255582

All Sites

As Above

All Sites

As Above

* This number to be used only for Control matters.

Electricity North West Limited Distribution Network Management Hub at Linley House is manned 24 hours a day.