London Underground SSR **Project Assurance**

MAINTENANCE STRATEGY & REQUIREMENTS

For Maintenance of the Barking Link

Project Title

BARKING LINK WORKS, Phase 2 (GF)

Signed ..... Date:
Print Name GAB PARRIS
LU Technical Sponsor

Signed ..... Date:
Print Name JIM HAWKESWELL
NR Technical Sponsor

Signed ..... Date:
Print Name FRANK FULLICK
SSL South Area Infrastructure Manager

Signed ..... Date:
Print Name CARL HUNT
Network Rail Infrastructure Maintenance Engineer

Revision No:	Date:	Details of amendments:
Rev 1	17/07/08	Documents 'Maintenance Strategy' and 'Maintenance Requirements' merged into this version.
Rev 2	02/09/08	Arrangements for Keys updated in line with Ian Harman's comments. MDUM now included as NR signatory. MR SIM comments added.

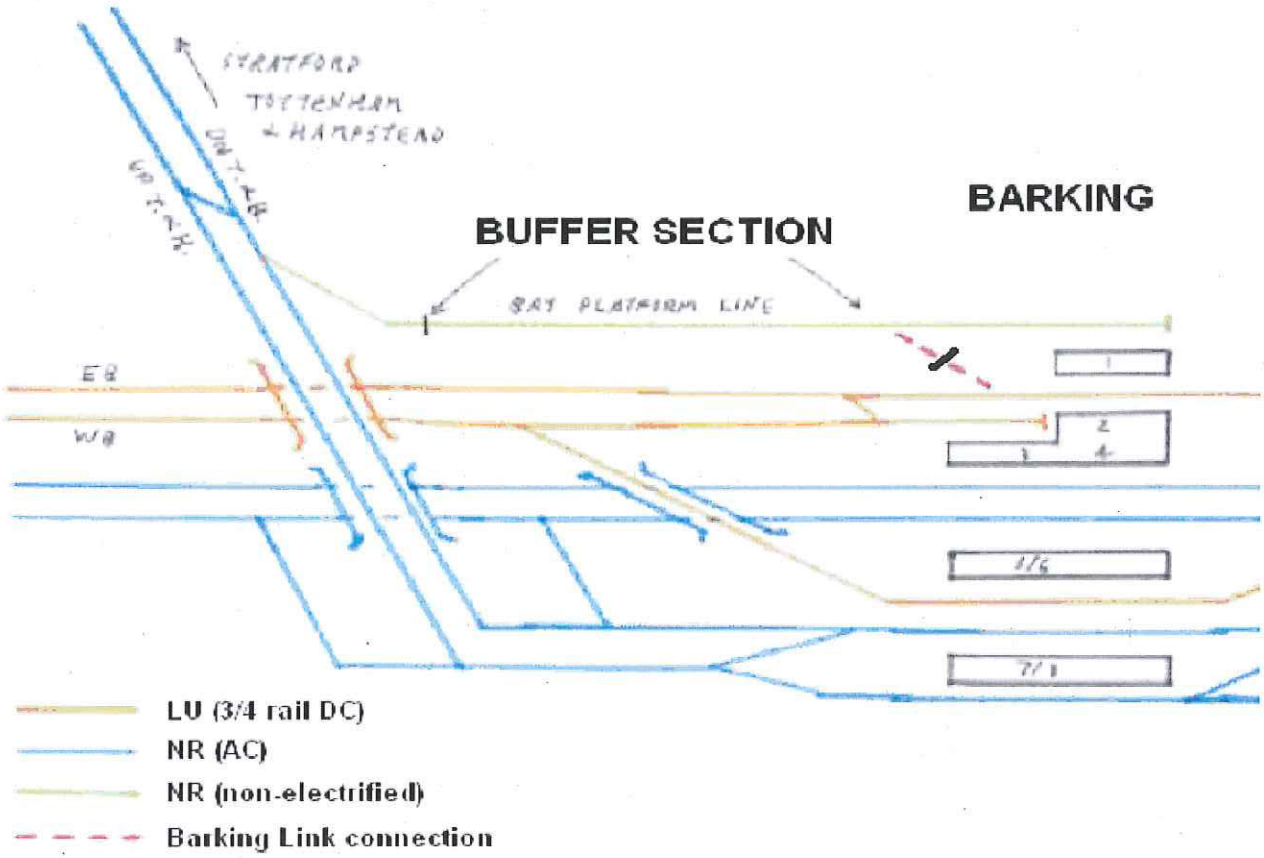
Based on the separate Maintenance Strategy and Maintenance Requirements Documents (history below)		
Rev 1	*14/06/08*	*Issued following 'Maintenance Workshop' 11/6/08 for comments*
Rev 2	*20/06/08*	*Finalised following comments from NR and MR*
Rev 3	*16/07/08*	*Format change; addition of requirement for joint attendance for signalling maintainers; minor tidy up; addition of reference to Maintenance Requirements document*
Rev 4	*18/09/09*	*Phase 2 (GF) represented and interfaces highlighted*
Rev 5	*22/10/09*	*Updated to include comments received from R4*

1.0 Maintenance Strategy - Précis

Operationally the crossover will primarily be utilised on weekends during LU possessions and the design philosophy has been developed on this understanding. At the start of a weekend of track replacement, a possession will be taken to segregate the area of the District line over which the engineering train will be operating from the remainder of the line over which passenger services will continue to operate. During this possession, engineering trains will move between NR and LU infrastructure. NR are not required to hold a back-to-back possessions for the whole weekend. At the end of the weekend of track replacement, the possession will be given up and normal signalling will be resumed.

An agreed protocol defining each of these operations for both the interim manually operated and the final (indicated) phase, as well as for routine maintenance, has been developed during extended consultation with all stakeholders. The Stakeholders associated with the link include; Network Rail, Metronet Rail (as was), London Underground, Freight Operating Companies, and Passenger Train Operating Companies.

Site specific data



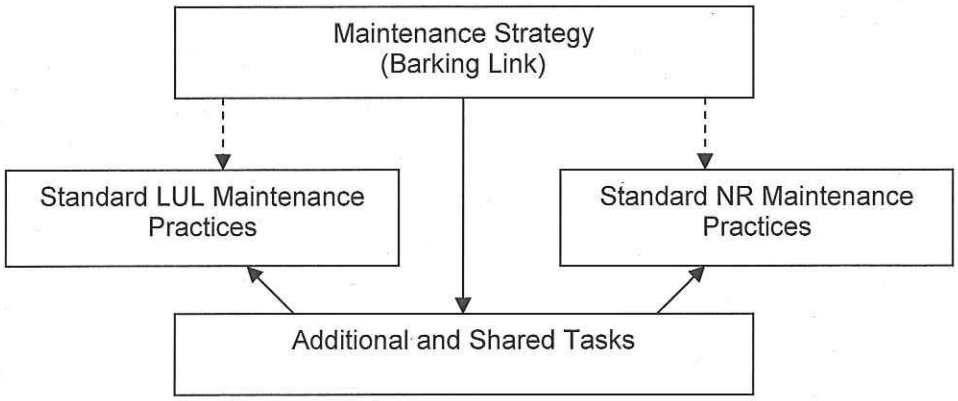
Isolation

Specific attention has been given to the safe isolation of the signalling systems. A standard HVI(NR) to DEV(LU) bonding arrangement has been installed, and all track boundaries on the NR Bay road are double IBJs. Their positioning creates a buffer section which prevents traction faults crossing between the NR mainline and LU infrastructures. An LU/NR agreed maintenance regime of the IBJ configurations has been put in place which is represented in this document.

1.1 *Introduction*

The unique aspects of this installation are the effects each infrastructures signalling arrangements have on the other network and that the IBJs require regular proving by electrical testing.

This document therefore describes the overarching maintenance and protection strategy for the Barking Link, which requires that the Infrastructure Managers undertake their normal maintenance practices for the new and modified assets, except where specified otherwise in this document.



Strategic Stipulations

1. Maintenance of the Network Rail side of the link will be carried out by Network Rail maintainers

2. Maintenance of the London Underground side of the link will be carried out by London Underground maintainers

3. The signal design must not be modified, altered or temporarily re-wired without the consent of each opposing Signal Design Authority.

4. The planned and unplanned maintenance of signalling/track equipment (including tamping) at either end of the points will require notification to both NR/LU where there is a requirement for the attendance and participation of the signalling/track maintainers for the other end in order to perform track/signals circuitry/interoperability checks. This constitutes a shared task in co-ordinating the planned maintenance and effectively responding to faults. Frequencies for these shared activities are given in the table in section 2.3 below.

5. Boundary – The boundary between the two infrastructures is indicated by a plated sleeper and is located two sleepers east of the insulated-block joint on the plain line between the turnouts. Refer to Appendices for Maintenance Boundary Diagram
   - London Underground maintainers will maintain the insulated block joint and up to this boundary, including the plated sleeper).
   - Network Rail will maintain the rail east of the block joint to the boundary.

6. Maintenance is only permitted when there is a possession on both sides concurrently. A possession may be substituted for:
   - Network Rail white period, and

- LU Engineering Hours
- Note that Maintenance work is not permitted to 'piggyback' on another possession

7. Full maintenance shall be undertaken in accordance with defined maintenance practice of the maintaining organisation.

8. When a possession is taken on the LU side the Protection KeySwitch shall be activated. The Key for this shall be obtained in accordance with the Key Procedure defined in Appendix A.
   - During normal traffic hours both sets of points shall be secured normal with scotches, clips and padlocks and donuts fitted on the LU points and the HW200 PM and the GF control panel uniquely padlocked on the NR side.
   - On completion of any maintenance or fault response activity the link shall be secured normal again utilising these mechanisms.
   - The keys for the padlocks shall be obtained in accordance with the Key Procedure defined in Appendix A.
   - See 'Donut' Switch Securing Block drawing number REPW 759a for details on how to install the donut.

9. The patroller will visually inspect the points three times/week to confirm that the scotches. clips, padlocks and donuts are in place and correctly fitted.

10. Arrangements for specific and shared maintenance tasks are detailed in the Maintenance Requirements listed in the next section – separate listings are provided for LU and Network Rail infrastructure (to facilitate onward dissemination).

1. Maintenance Requirements

1.1. *Introduction*

This section describes the particular maintenance requirements and procedures that shall be observed when carrying out maintenance activities on the Barking Link – these are because of the interconnection of the Network Rail and London Underground systems.

Note that the normal maintenance specifications and instructions apply, but are supplemented by coordinated tasks as described below.

It is intended that this document is issued to LU and to Network Rail and for each company to adopt the specified maintenance requirements.

1.2. *Safety Controls in place*

Points movement for maintenance is only authorised if there is a possession or equivalent train protection (e.g. NR T2) in place on each side of the Link.

A possession on the LU side may be waived if the maintenance is being undertaken in LU Engineering Hours

Points **MUST** be returned to normal and secured at the end of maintenance activity

Supporting Arrangements

To release the points, the scotches, clips and padlocks together with the 'Donuts' must be removed from the LU point, and the HW2000 and GF control panel padlock on the NR side need to removed

To re-secure the points normal at the end of any works all of these devices must be replaced.

- See Key Procedure for the arrangements on authorised use of the Keys (Appendix A)
- See 'Donut' Switch Securing Block drawing number REPW 759a for details on how to install the donut.

1.3. *Summary of Maintenance inspections*

Inspection	NR	LU
Track Patrolling	#Twice Weekly	72 hours
Signal	*6 weeks	6 weeks
Track	*8 weeks	8 weeks

Frequency arrangements will be arranged locally in line with current standards and practise. Inspection dates to be scheduled on Ellipse

increased frequency for patrol inspection of points securing devices

* To facilitate electrical proving of the IBJs during routine inspections

Maintenance Requirements

LU infrastructure

Characteristics of the line:

- Signalling arrangements provide flanking detection to protect against wrong-side train movements between networks.
- The LU Points will be clipped and scotched and "Donut'd" in the normal position using padlocks
- LU property extends to the plated sleeper, located just west of the double insulated block joints, approximately halfway across the link. LU is responsible for maintaining up to and East of this point, NR maintains up to and West of this point
- The Point Machine will not be powered
- The signalling system will detect normal points on the LU side and on the NR side at all times

Maintenance Required

- Track – normal inspection, grinding, leaf clearing, etc,.
- The Track Patrol Inspection shall include a visual check that the protective devices (point clip, padlock, donut and scotch) are in position at all times except during maintenance and during a possession for passing trains over the link – this to be included at 72 hour intervals.
- Track tamping - when performed, shall include, EITHER a combined tamp across both lines and the link using a dual-approved tamper, OR hand-tamping on the link in order to remove voids, and maintain twist and level after mainline tamping has occurred. Each side shall be checked for level, alignment and twist faults.
- Signalling – all signalling assets maintained as normal, including inspecting Points and test as normal on a 6-weekly cycle. Note that the points are not powered, so this part of the normal maintenance regime cannot be carried out. The inspection shall be planned to occur on the same shift and time as the Network Rail inspection, in order to perform the check that the NR points detection is working on the LU circuit. During these inspections the LU protection key switch and NR ground frame release shall be operated.
- Specific attention is to be given to proving that the IBJs are providing electrical isolation

Fault Repairs

- Track – repair work that encroaches onto the NR infrastructure (e.g. changing sleepers on the link, repairs), shall be planned for a time that reduces the impact on NR traffic. Any track work which has the potential to impact on signal detection shall only be undertaken with NR and LU signalling in attendance.
- Signalling - fault attention to the circuits that are connected to NR shall be done with NR maintainers present, and at a time that causes least disruption to NR traffic, if possible.
- Fault repairs for any discipline may require the taking of T2, possession or other train protection blocks on the NR network in order to safeguard the passing of their trains. The first line of response will be responsible for ensuring that both NR and LU are in attendance. This shall be instructed to the Fault Report Centre

Maintenance Requirements

NR infrastructure

Characteristics of the line:

- Signalling arrangements provide flanking protection to protect against wrong-side train movements onto LU infrastructure at all times.
- Signalling arrangements provide track circuit and interlocking for movements from LU onto NR, but only when the Possession Keyswitch is operated.
- The NR Points Machine (HW2000) will be secured in the normal position using a unique padlock, as will the Ground Frame (GF) control panel door.
- NR property extends to the plated sleeper, located just west of the double insulated block joints, approximately halfway across the link. LU is responsible for maintaining up to and East of this point, NR maintains up to and West of this point.
- The Point Machine will be powered, and operated locally after a release is given from the Upminster the IECC. A direct phone line is used to communicate between the two
- The signalling system will indicate normal points on the LU side and on the NR side at all times

Maintenance Required

- Track – normal inspection and maintenance, etc.
- The PWay patrol shall include a visual check that the protective devices (padlocks) are in position at all times except during maintenance and during a possession for passing trains over the link – this to be achieved by a twice-weekly inspection.
- Track tamping - when performed, must include, EITHER a combined tamp across both lines and the link using a dual-approved tamper, OR hand-tamping on the link in order to remove voids, and maintain twist and level after mainline tamping has occurred.
- Signalling – all signalling assets maintained as normal, including inspecting points and test as normal to a 6-weekly cycle. Point maintenance will be undertaken jointly on the same shift as a planned activity between LUL Signal Maintainers and NR Signal Maintainers, the exact date to be agreed between the LUL Signal Operations Manager (SOM) on Tel: 020 7918 5014 and NR. During these inspections the LU protection key switch and NR ground frame release shall be operated.
- Specific attention is to be given to proving that the IBJs are providing electrical isolation

Fault Repairs

- Track – repair work that encroaches onto the LU infrastructure (e.g. changing sleepers or rails within the link), must be planned for a time that reduces the impact on LU traffic. Any track work which has the potential to impact on signal detection shall only be undertaken with NR and LU signalling in attendance.
- Signalling fault attention to the circuits that are connected to LU must be done with LU maintainers present, and at a time that causes least disruption to LU traffic, if possible.
- Fault repairs for any discipline may require the taking of possession or other train protection blocks on the LU network in order to safeguard the passing of their trains. The first line of response will be responsible for ensuring that both NR and LU are in attendance. This must be instructed to the Fault Report Centre.

2.4 *Document References*

- Hazard Identification of Points on Network Rail not Normal for Normal Operation. Doc Ref TRL –RT02-R-05 Issue 5.
- Switch Securing Block drawing number REPW 759a

2.5 *Appendices*

- Appendix A Arrangements for the Keys
- Appendix B Maintenance Boundaries Diagrams

Appendix A

Barking Link Engineers Cross-Over

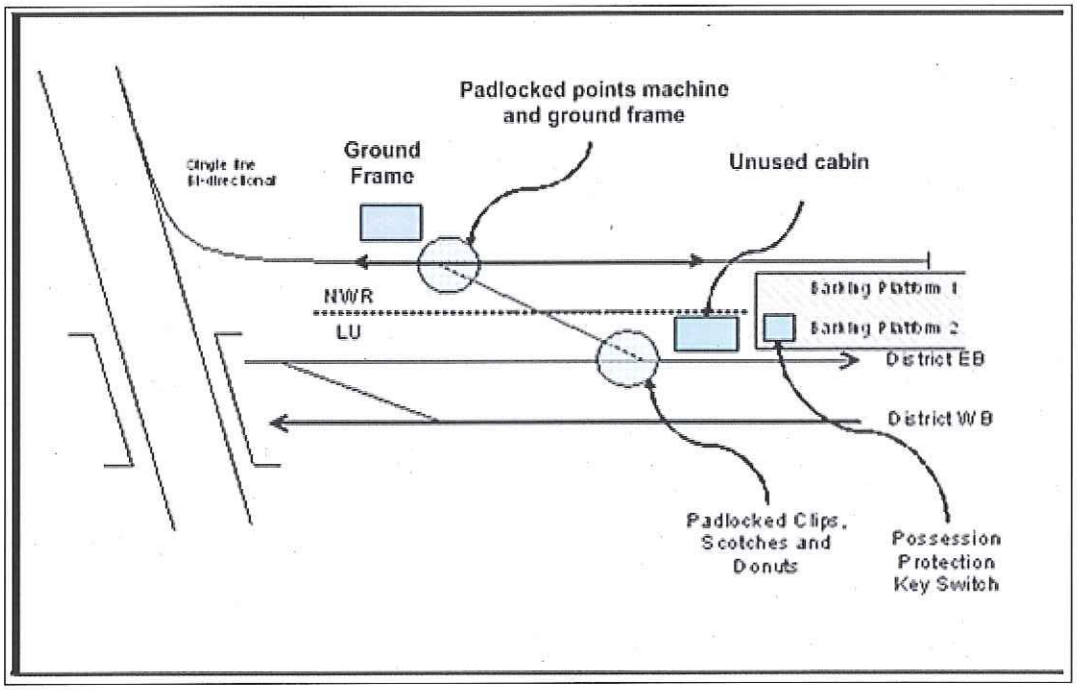
Arrangements for the Keys

1.0 Introduction

This document describes the arrangements for the various keys that are required to release safety systems and mechanisms that are installed on the Barking Link crossover and the procedures that should be observed when obtaining and using the keys on this asset.

Various keys secure the safety systems on the Barking Link as shown in the diagram below. Each key is unique, individual and is identified by the following colour coding system:

- Padlocks on the clips, scotches and 'Donuts' on the LU points, red
- Padlocks on the HW2000 and the GF control panel NR points, blue
- LU possession Protection Key Switch, yellow
- LU Ground Control Signal Panel (not utilised) green



Following discussion at a maintenance workshop (Romford, 11/06/08), it was agreed that all keys would be held by the LU Signaller, Barking Signal Cabin, in order to provide security and 24 hour access.

1.1 Location and Procedure for Issue of the Barking Link Keys:

- The Keys for LU Assets on the Barking Link are held by the LU Signaller in the Barking Signalling Cabin, who is onsite 24 hours.
- The keys shall be held in a secure manner (e.g. in a locked key-box)
- The issuing of keys must be by the LU Signalling Manager who will be responsible for maintaining the key sign in/out log to ensure the location of the issued keys at any point in time if fully recorded.
- The Keys held by the signaller include:

  - Padlock keys (NR) PM and GF
  - Clip, scotch and donut Padlock keys (LU)
  - Possession Key Switch key
  - Key to unlock and operate the Signalling Ground Control Panel (not reqd)
- Only authorised personnel may sign out the Barking Link Keys. Staff identification must be provided to the LU Signaller as per the competencies below:-
  - Signal Maintenance Staff or PICOP (NR) for NR points keys
  - Signal Maintenance Staff or POM (LU) for LU points keys
  - Any other person in possession of a signed letter of authority from the LU Signal Asset Engineer, or NR Signalling Engineer for their company's keys
- To sign out the keys, the signatory must produce the appropriate identification and certificates (or letter of authority) to enable access to the track and to the link itself
- The LU Signaller will hold a current list of all LU maintenance staff that can hold an AWC for issues of the keys.

1.2 Reponsibilities of Signing-Out the Keys

- In signing out the Barking Link keys, the signatory takes responsibility for
  1. Safeguarding of the keys and immediate return to the LU signaller once works are complete
  2. Safe use and/or maintenance of the Link – according to agreed procedures and protocols *(Note that points can only be moved if there is a possession (or equivalent) in place on both sides of the Link)*
  3. Returning the Link to a safe operating condition at the end of the signing-out period

1.3 Signing the Keys back In

To sign the Barking Link keys back in, the signatory declares that all the keys have been returned and that the link has been left in a safe condition. The following checklist should be used:

Have the points been returned to the normal position?	☐
Have the Clips and Scotches been fitted correctly? (LU Only)	☐
Have the Donuts been fitted correctly? (LU only)	☐
Have the Padlocks been attached and locked to all components?	☐
Has the possession Protection Key Switch been disabled?	☐
Has the Ground Frame Panel been disabled and locked shut?	☐

This list is to be inserted in the front page of the key issue register.

2.0 Points Winding Handles

Note that signalling maintenance staff will keep winding handles for the (HW2000 and M63) points in their own care, for use during maintenance operations. A spare points winding handle will be located in the clip and scotch cabinet for each party. The clip and scotch cabinet will be attached to the side of the GCP Room.

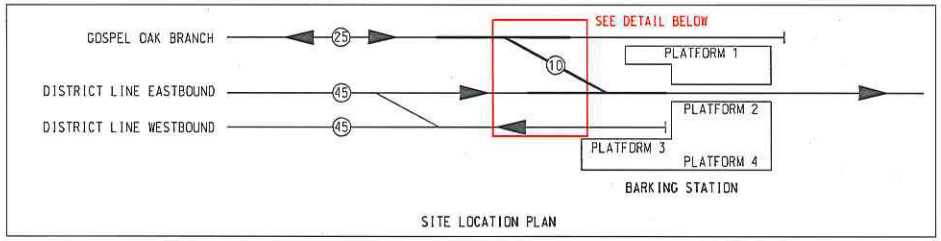
When train movements are planned, the NR Operational staff involved in point winding must bring a suitable (HW2000) winding handle. For the LU points, the winding handle will be available from LU Rail signal maintenance staff and onsite TO for points moving.

Appendix B

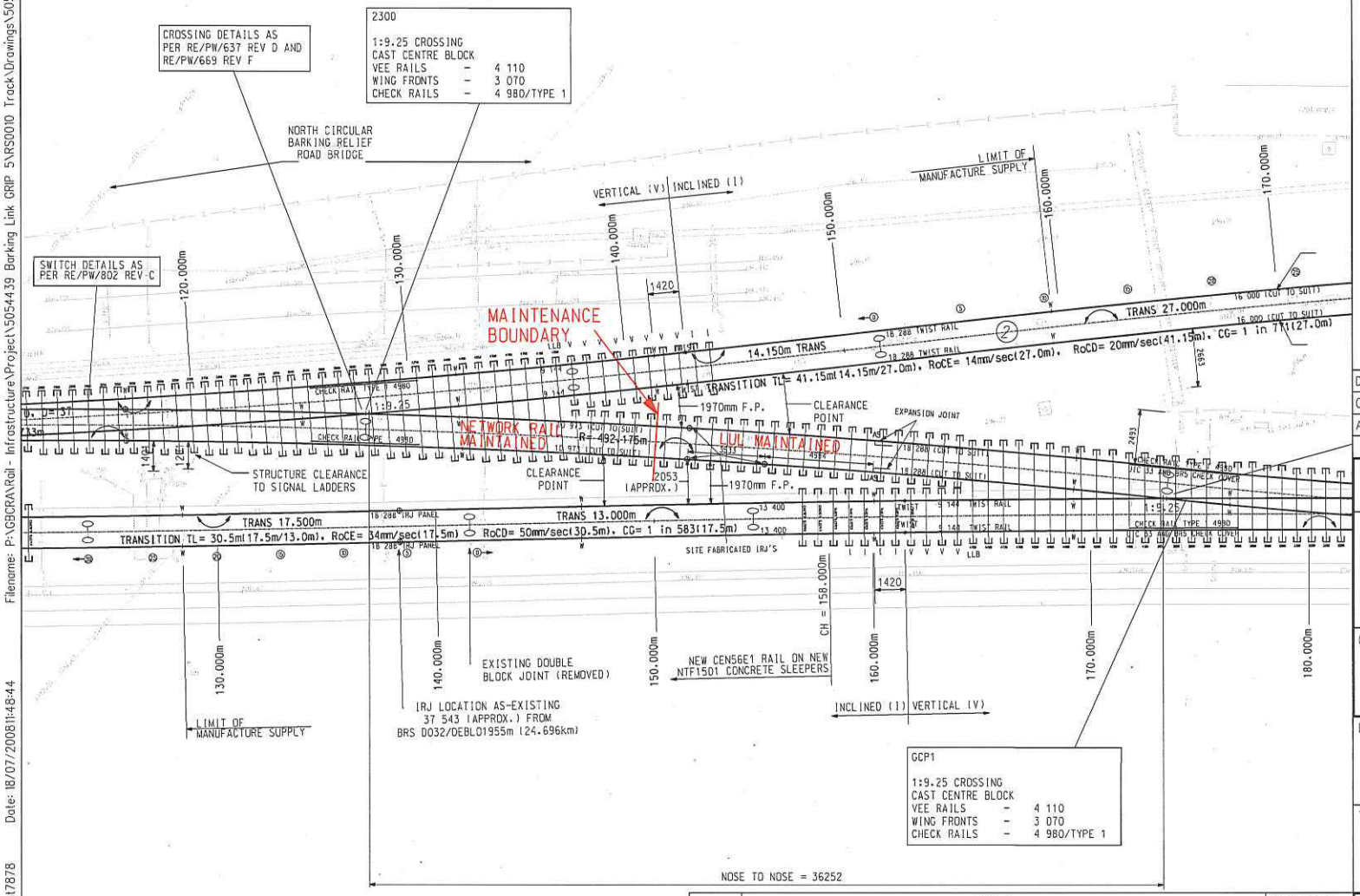
Maintenance Boundary Diagrams (Attached separate to this document)

- **P.Way Maintenance Boundary Drawing Number 5054439-CPW-006**
- **Barking Link Boundary Diagrams Doc Ref ATK-BL-BOUNDARYDIAG-001**

DO NOT SCALE



SITE LOCATION PLAN



NOTES:

THE INTENTION OF THIS DRAWING IS TO DEPICT THE AGREED MAINTENANCE BOUNDARY BETWEEN NETWORK RAIL AND LUL. IT SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

THIS DRAWING IS COMPILED FROM AN EXTRACT OF DRAWING 5054439/CPW/001/A5.

	By	Date	Purpose of Issue / Description
Drawn	JS	18-07-08	A1 – INITIAL ISSUE
Checked	JH	18-07-08	
Authorised	JF	18-07-08	

Drawing Status: APPROVAL

ATKINS
No.1 Croydon
12-16 Addiscombe Road
Croydon
CR0 0XT
Tel. +44 (0)20 8663 5000
Fax. +44 (0)20 8663 5111

Client: METRONET

Project: BARKING LINK

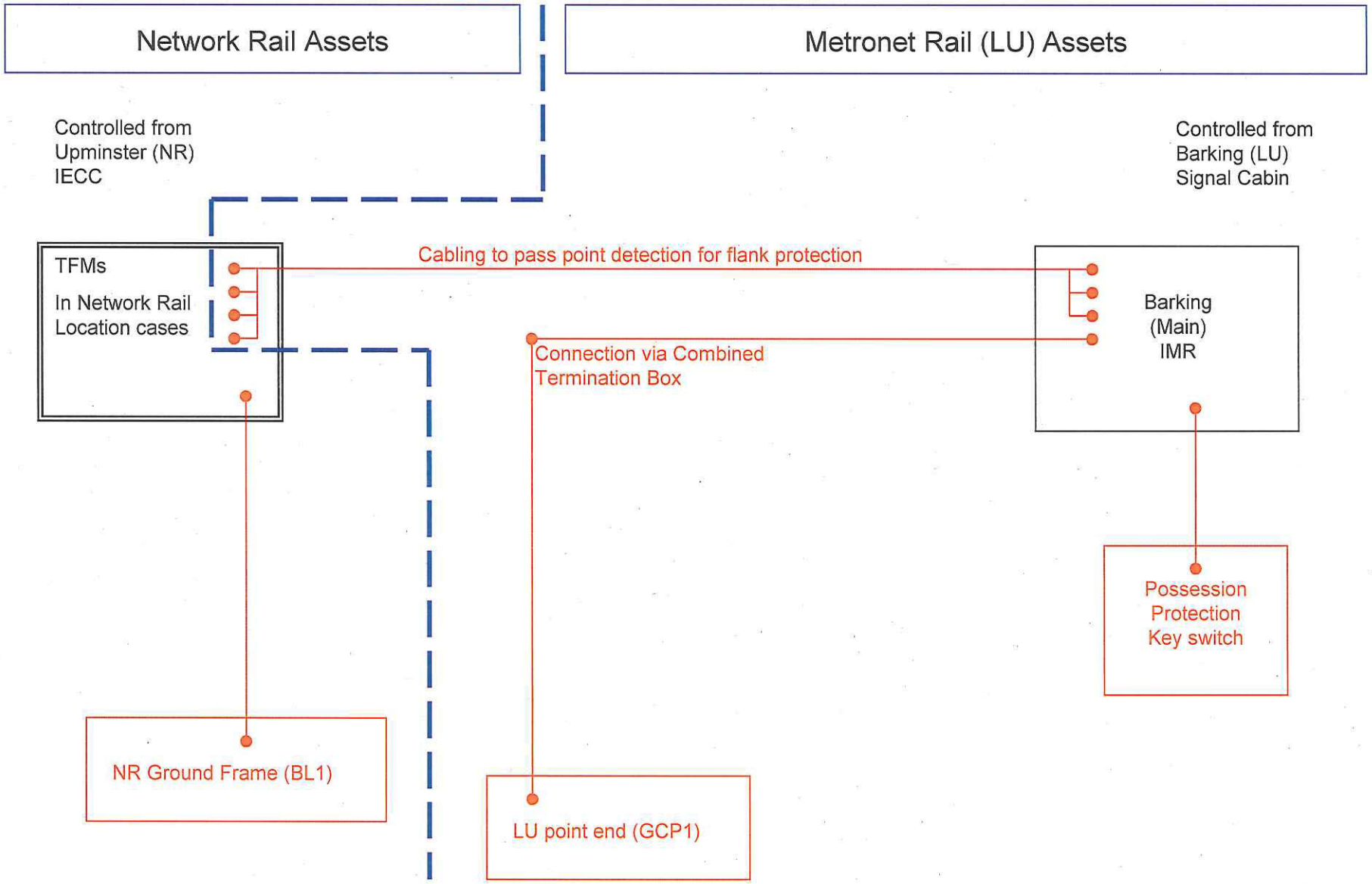
Title: DIAGRAM DEPICTING THE MAINTENANCE BOUNDARY BETWEEN NETWORK RAIL AND LUL

A3 | 0 10 Millimetres 100 | Original Scale 1:200

Drawing Number: 5054439 / CPW / 006 | Revision: A1

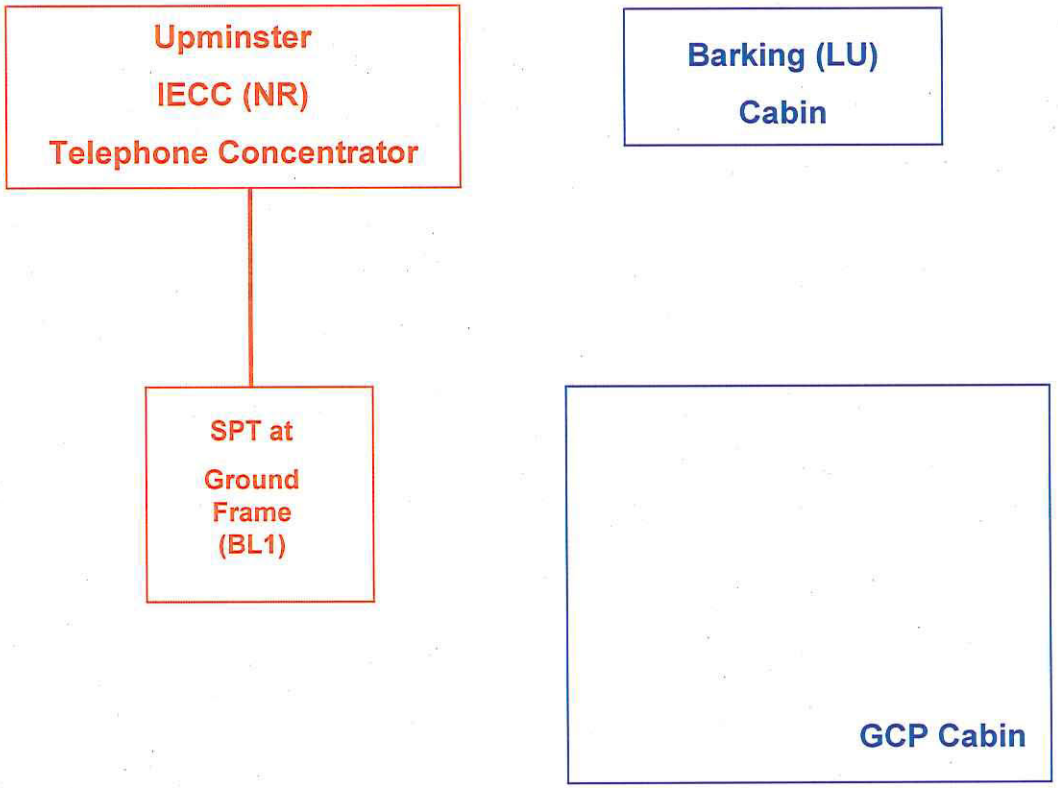
Barking Link Signalling Phase GF

v1



Barking Link Telecoms Phase GF

v1



Legend:

NR Asset

MR (LU) Asset (note – no new Telephones present)