

**C0033 – NETWORK RAIL EV CHARGING POINT  
INSTALLATION PROJECT  
DECARBONISATION PROGRAMME  
MANCHESTER PICCADILLY SHORT STAY CAR PARK  
E&P FORM A**

**C0033-POI-FOA-EP-140001**

**eB No.: 172768-KCL-FOA-EDS-000036**

**Revision: A02**

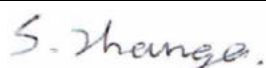
**Date: 1<sup>st</sup> July 2022**



**[www.poisegroup.uk](http://www.poisegroup.uk)**

|                                                                                                                                   |                           |                 |               |               |                   |         |
|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| <b>C0033 – Network Rail EV Charging Point Installation</b><br><br><b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> | Document Reference Number |                 |               |               |                   |         |
|                                                                                                                                   | Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
|                                                                                                                                   | 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

|                                                                                                           |                                                                |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>Project:</b><br>Network Rail EV Charging Point Installation                                            | <b>Project No.</b><br>172768                                   |
| <b>Submission Title:</b><br>Manchester Piccadilly Short Stay Car Park E&P Form A                          | <b>Document Reference Number:</b><br>172768-KCL-FOA-EDS-000036 |
| <b>Name of Organisation:</b><br>Poise Group Ltd                                                           | <b>ELR:</b><br>-                                               |
| <b>Location (miles, chains):</b><br>Manchester Piccadilly Station, Station Approach, Manchester (M60 7RT) | <b>Location (OS):</b><br>-                                     |

| Endorsement | Name         | Title                      | Signature                                                                             |
|-------------|--------------|----------------------------|---------------------------------------------------------------------------------------|
| Prepared by | Nick Chung   | Electrical Engineer        |  |
| Checked by  | Thanga Haran | Senior Electrical Engineer |  |
| Approved by | Naeem Riaz   | Lead Electrical Engineer   |  |

### Version History

| Version | Status | Details                     | Date       |
|---------|--------|-----------------------------|------------|
| A01     | Issued | For Approval                | 06/05/2022 |
| A02     | Issued | IFA – Comments Incorporated | 01/07/2022 |

|                                                                 |
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## FORM A (ELECTRICAL POWER)

### APPROVAL IN PRINCIPLE OF SINGLE OPTION SELECTION

#### Part 1 Submission details

|                                             |                                                                 |                      |                                                  |
|---------------------------------------------|-----------------------------------------------------------------|----------------------|--------------------------------------------------|
| Project                                     | <b>Network Rail EV Charging Point Installation</b>              | Project No.          | <b>C0033</b>                                     |
| Submission Title                            | <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> | Submission Reference | <b>172768-KCL-FOA-EDS-000036</b>                 |
| Name of Organisation (where external to NR) | <b>Poise Group Ltd</b>                                          | Location             | <b>Manchester Piccadilly Short Stay Car Park</b> |

#### Part 2 Submission Details

Submission Details (to be attached to this form):

a) List of Documentation

172768-KCL-FOA-EDS-000036 – Manchester Piccadilly Station Short Stay Car Park E&P Form A

172768-KCL-RA-EDS-000014 – Manchester Piccadilly Station Short Stay Car Park E&P Designer's Risk Assessment

172768-KCL-REG-EDS-000013 – Manchester Piccadilly Station Short Stay Car Park E&P Assumption Register

b) List of Drawings

Refer to Appendix C

c) List Other Engineering Deliverables Relevant to this Submission

172768-KCL-REG-ECV-000015 – Manchester Piccadilly Station Short Stay Car Park Civils Assumption Register

172768-KCL-F01-ECV-0000016 – Manchester Piccadilly Station Short Stay Car Park Civils Form 001

d) Other Supporting Documents - Refer to 'References'

I certify that this design submission meets the requirements outlined in Network Rail Standard NR/L2/ELP/27311 and complies with the PRS.

|                         |                                                                                     |       |            |
|-------------------------|-------------------------------------------------------------------------------------|-------|------------|
| Signed                  |  | Title | <b>CRE</b> |
| Name (print)            | NAEEM RIAZ                                                                          | Date  | 01.07.2022 |
| Comments:               |                                                                                     |       |            |
| To be signed by the CRE |                                                                                     |       |            |

#### Part 3 Submission Acceptance

I have considered this submission for Approval in Principle as required by Network Rail Standard NR/L2/ELP/27311, and I hereby give Acceptance for the submission.

|                                                                 |
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|                                                                                                                                           |                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Signed                                                   | Title Designated Project Engineer |
| Name (print) Usman Khan                                                                                                                   | Date 08/07/2022                   |
| Comments: Detailed Design (Grip 5) to incorporate comments by Peter Gee (Asset Engineer) as appended (email) at the end of this document. |                                   |
| To be signed by the Network Rail Project Engineer                                                                                         |                                   |

#### Part 4 Approval in Principle

I have considered this submission for Approval in Principle as required by Network Rail Standard NR/L2/ELP/27311, and I hereby given Approval in Principle for the submission.

|                                                                                                                        |                                          |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Signed                                | Title Asset Engineer (Building Services) |
| Name (print) PETER GEE                                                                                                 | Date 8th July 2022                       |
| Comments: Please refer to my email dated 19th May 2022 attached to the bottom of this document.                        |                                          |
| To be signed by the Network Rail <del>Route Asset Manager</del> (or their representative) Engineer (Building Services) |                                          |

|                                                                 |
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# 1 Abbreviations

| Abbreviations | Description                       |
|---------------|-----------------------------------|
| AC            | Alternating Current               |
| AIP           | Approval in Principle             |
| BS            | British Standard                  |
| CEM           | Contractor's Engineering Manager  |
| CMS           | Cable Management System           |
| CRE           | Contractor's Responsible Engineer |
| CRT           | Contract Requirement Technical    |
| CP            | Charging Points                   |
| Cu            | Copper                            |
| DB            | Distribution Board                |
| DC            | Direct Current                    |
| DDA           | Disability Discrimination Act     |
| DNO           | Distribution Network Operator     |
| DPE           | Designated Project Engineer       |
| DRA           | Designer's Risk Assessment        |
| E&P           | Electrification and Plant         |
| ELR           | Engineering Line Reference        |
| EaWR          | Electricity at Work Regulation    |
| ECR           | Electrical Control Room           |
| EIS           | Entry into Service                |
| EMC           | Electromagnetic Compatibility     |
| EMI           | Electromagnetic Interference      |
| EN            | European Norm                     |
| EV            | Electric Vehicle                  |
| FAT           | Factory Acceptance Test           |

|                                                                 |
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| Abbreviations | Description                                |
|---------------|--------------------------------------------|
| GRP           | Glass Reinforced Plastic                   |
| GRIP          | Governance for Railway Investment Projects |
| HV            | High Voltage                               |
| IDC           | Interdisciplinary Check                    |
| IDR           | Interdisciplinary Review                   |
| IET           | Institution of Engineering & Technology    |
| LV            | Low Voltage                                |
| LVAC          | Low Voltage Alternating Current            |
| MCB           | Miniature Circuit Breaker                  |
| MCCB          | Moulded Case Circuit Breaker               |
| NR            | Network Rail                               |
| NRG           | National Records Group                     |
| O&M           | Operation & Maintenance (manual)           |
| ODS           | Outline Design Statement                   |
| RAM           | Route Asset Manager                        |
| RCD           | Residual Current Device                    |
| RFI           | Request for Information                    |
| SAT           | Site Acceptance Test                       |
| SP&N          | Single Phase and Neutral                   |
| SP&SN         | Single Pole & Switched Neutral             |
| SWA           | Steel Wire Armour                          |
| T&C           | Testing and Commissioning                  |
| TP&N          | Three Phase & Neutral                      |
| TQ            | Technical Query                            |
| TWS           | Technical Work Scope                       |

**Table 1. List of Abbreviations**

|                                                                 |
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## 2 Design Standards

All design work was carried out in compliance with the following standards:

- British Standard Specifications.
- British Standard Codes of Practice.
- IET Wiring Regulations, current edition (BS 7671)
- Electricity at Work Regulations.
- UK Health and Safety at Work Act.
- All Statutory Acts, Regulations, and Instruments.
- UK Construction Design and Management Regulations.
- All byelaws and Regulations of the Relevant Local Authority and States Authorities.
- Control of Pollution Act
- Environmental Protection
- The Waste Management Licensing Regulations 1994
- EC Directive on Hazardous Waste

The Health and Safety at Work Act requires that the contractor shall provide adequate protection for their personnel against any hazard that may present itself on the site. If there is a particular hazard that a Network Rail Representative wishes to draw to the attention of the contractor, then this will be detailed in the Specification. Should a hazard be detailed this does not imply that it is the only hazard to be safeguarded against.

The electrical design has been undertaken in accordance with the latest British Standards, Network Rail Company Standards and other applicable standards, which include (but are not limited to) the following versions:

| Network Rail Standards |                                                                            |       |            |
|------------------------|----------------------------------------------------------------------------|-------|------------|
| Number                 | Title                                                                      | Issue | Date       |
| NR/GN/CPR/401          | Guidance on Contractual Health & Safety Requirements                       | E1    | 01/12/2008 |
| NR/L3/CPR/306          | Disposal of Redundant Railway Assets                                       | E4    | 09/07/2019 |
| NR/L2/EBM/088          | Arrangements for Maintenance of New & Changed Assets                       | 4.0   | 06/06/2009 |
| NR/SP/ELP/27242        | Specification of low voltage electrical installations on railway premises. | E1    | 03/12/2005 |
| NR/L2/INF/02202        | Record Management of Health & Safety Files                                 | 6.0   | 05/03/2016 |

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| Network Rail Standards  |                                                                                                                                  |         |            |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------|------------|
| Number                  | Title                                                                                                                            | Issue   | Date       |
| NR/L2/ELP/27238         | Maintenance Specification of Fixed Plant & Equipment                                                                             | 7.0     | 04/07/2014 |
| BS 8666                 | Specification for Scheduling, Dimensioning, Bending and Cutting of Steel Reinforcement for Concrete                              | 2020 Ed | 14/12/2020 |
| BS 7671: 2018 + A1:2020 | Requirements for Electrical Installations, IET Wiring Regulations                                                                | 2018 Ed | 06/2018    |
| BS EN 50122             | Railway Applications – Fixed Installations – Part 1: Protective provisions relating to electrical safety and earthing            | -       | -          |
| GL/RT 1255              | Guidance for Low Voltage Electrical Installations                                                                                | -       | -          |
| EN-ISO 9001             | Quality management systems - Requirements                                                                                        | 2015 Ed | 23/09/2015 |
| NR/CS/CIV/044           | Managing Structures Works                                                                                                        | 1.0     | 04/2004    |
| NR/GN/CIV/002           | Application and Reapplication of Protective Treatment to Network Rail Infrastructure                                             | 5.0     | 07/03/2009 |
| NR/GN/CIV/133           | Information required for an Approval in Principle submission                                                                     | 1.0     | 04/2005    |
| NR/GN/CPR/401           | Guidance on Contractual Health and Safety Requirements                                                                           | E1      | 03/03/2018 |
| NR/L1/AMG/1010          | Policy on Working Safely in the Vicinity of Buried Service                                                                       | 1.0     | 01/12/2008 |
| NR/L1/INI/PM/GRIP/100   | Governance for Railway Investment (GRIP) Projects                                                                                | 5.0     | 02/09/2017 |
| NR/L2/EBM/029           | Product Introduction and Change                                                                                                  | 9.0     | 06/03/2010 |
| NR/L2/INF/02202         | Records Management of Health & Safety Files                                                                                      | 6.0     | 05/03/2016 |
| NR/L2/INI/02009         | Engineering Management for Projects                                                                                              | 7.0     | 06/03/2021 |
| NR/L2/OHS/0047          | Managing Health and Safety in Construction (Application of the Construction (Design and Management) Regulations to Network Rail) | 7.0     | 01/06/2019 |

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| Network Rail Standards     |                                                                                                                         |       |            |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------|-------|------------|
| Number                     | Title                                                                                                                   | Issue | Date       |
| NR/L2/CIV/003              | Engineering Assurance of Building and Civil Engineering Works                                                           | 6.0   | 05/09/2020 |
| NR/L2/ELP/27311            | Engineering Assurance Requirements for Design and Implementation of Electrical Power Engineering Infrastructure Project | 6.0   | 05/09/2020 |
| NR/L2/AMG/1020             | Buried Services Data Provision                                                                                          | 1.0   | 01/12/2008 |
| NR/L2/OHS/019              | Safety of People working on or near the line                                                                            | 10.0  | 05/12/2020 |
| NR/L2/TEL/00013            | Cable Troughing                                                                                                         | 4.0   | 05/03/2016 |
| NR/L2/CIV/140              | Model Clauses for Engineering Works                                                                                     | 12.0  | 04/03/2017 |
| NR/L2/AMG/1030             | Working Safely in the Vicinity of Buried Services                                                                       | 1.0   | 01/12/2008 |
| NR/L2/ELP/27311            | Engineering Assurance Requirements for Design and Implementation of Electrical Power                                    | 6.0   | 05/09/2020 |
| NR/L3/ELP/22001            | Procedure and competence requirements for persons undertaking works in the vicinity of high voltage cables              | 1.0   | 26/08/2008 |
| NR/L3/ELP/27406            | Engineering Deliverable Requirements for Electrical Power Asset Design                                                  | 2.0   | 03/12/2011 |
| NR/L3/ELP/27406 - Module A | Engineering Deliverable Requirements for Electrical Power Asset Design –Generic Requirements                            | 2.0   | 03/12/2011 |
| NR/L3/ELP/27406-Module C   | Engineering Deliverable Requirements for Electrical Power                                                               | 1.0   | 03/12/2011 |
| NR/L3/CIV/039              | Specification for the Assessment & Certification of Protective Coatings & Sealants                                      | 5.0   | 07/03/2009 |
| NR/L3/CIV/151              | Engineering Assurance of Standard Designs & Details for Building & Civil Engineering Works                              | 6.0   | 03/03/2012 |
| NR/SP/ELP/27242            | Specification of low voltage electrical installations on railway premises                                               | 1.0   | 03/12/2005 |
| NR/SP/ELP/27300            | Specification for Computer Aided Design Formats for Electrification and Plant Documentation                             | E1    | 05/09/2005 |
| NR/SP/ELP/40042            | Periodic Inspection and Testing of Electrical Installations                                                             | 3.0   | 01/02/2006 |

**Table 2. Applicable Standards**

|                                                                 |
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### 3 Reference Documents

| No. | Document Number                       | Document Title                                                                                                                                  |
|-----|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | 172768-KCL-FO1-ECV-000016             | <i>C0033 – Network Rail EV Charging Point Installation – Manchester Piccadilly Short Stay Station Car Park Civils Form 1, Poise Group Ltd</i>   |
| 2   | C0033-POI-REP-ELE-000013              | <i>C0033 – Network Rail EV Charging Point Installation – Manchester Piccadilly Short Stay Car Park Option Selection Report, Poise Group Ltd</i> |
| 3   | 172768 - EV Charging GRIP 1-4 CRT_.04 | <i>172768 - Network Rail EV Charging Point Installation Contract Requirement Technical (CRT)</i>                                                |
| 4   | -                                     | <i>SINGLE LINE DIAGRAM PACKAGE SUBSTATION MSBO1</i>                                                                                             |
| 5   | -                                     | <i>ELECTRICAL SERVICES MAIN EARTHING SCHEMATIC</i>                                                                                              |
| 6   | 172768-KCL-FOA-EDS-000028.2.SIGN      | <i>APPROVAL IN OUTLINE OF SINGLE OPTION SELECTION – Manchester Piccadilly Station</i>                                                           |

**Table 3. List of References**

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## 4 Overview

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### 4.1 Network Rail Sponsor

Robert Dunkley, Network Rail.

### 4.2 External Organisation(s) for Whose Benefit the Scheme is Required

Network Rail  
The Quadrant  
Elder Gate  
Milton Keynes, MK9 1EN

### 4.3 Proposed Date for Completion of Construction

The proposed completion date for this project is 2024.

### 4.4 Organisation Responsible for Design

Poise Group Ltd  
Fleet House  
8-12 New Bridge Street  
London  
EC4V 6AL

|                                                                 |
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## 5 Scheme Details

### 5.1 Introduction

An aim of DfT is to have one of the best electric vehicle infrastructure facilities in the world. This would enable current and prospective electric vehicle drivers being able to easily locate and access electric vehicle charging infrastructure that are affordable, efficient and reliable. Provision of electric vehicle charging infrastructure at stations will contribute to the government's "Road to Zero" strategy, which aims for at least half of new cars to be ultra-low emission by 2030.

Network Rail (NR) has a prime role to play in the government's decarbonisation agenda and to contribute to achievement of Government's ambition, NR had committed to deliver provision of electric vehicle charging infrastructure at stations in Phase 1. Currently, Phase 2 electric vehicle charging infrastructure for more sites have commenced. To this end, targets have been agreed with government for deployment of charge point infrastructure at station car parks for public vehicles. Manchester Piccadilly Short Stay Station Car Park is one of the station car parks which would be proposed for EV charging car parks for Phase 2 of the Decarbonisation Programme.

As part of the works, option selection surveys were undertaken by Poise along with Kier and Network Rail to identify the most feasible location and arrangement of the associated proposed equipment. The total no. of EV Chargers and types of chargers were agreed in the signed A1 – '172768-KCL-FOA-EDS-000028.2.SIGN' [Ref. 6] on 10.03.2022.

Network Rail has commissioned Poise Group to undertake Form A design for the installation of 5No. of EV charging points including 1No. DDA EV charging point at Manchester Piccadilly Short Stay Station Car Park.

This E&P Form A (Concept Design) document provides a technical specification for the E&P and specific LV works which shall be carried out at the Manchester Piccadilly Short Stay Station Car Park.

### 5.2 Route Objectives

The key driver of the project is the committed target made by NR to DfT to install EVCP at station car parks nationwide. The provision of charging points at station car parks will make a key contribution to accommodate the needs of people who do not have off-street parking by offering alternative services to home charging and it will provide a convenient way for the public to charge their vehicles whilst utilising the rail network.

### 5.3 Route Definition

NR has committed to the following:

- (Phase 2) – By 31.3.24, install a further 408 no. EVCPs across NR-managed station car parks nationally.

|                                                                 |
|-----------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b>      |
| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
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The breakdown of the minimum power requirement and no. of EV Chargers across the 19No. NR-managed station car parks is as below:

| No. | Location                                    | Address                                                              | Minimum Power Requirements | No. of Charge Points | Assumed Charger Type |
|-----|---------------------------------------------|----------------------------------------------------------------------|----------------------------|----------------------|----------------------|
| 1   | Birmingham New Street (short Stay)          | Birmingham New Street Station, Queens Dr, Birmingham B2 4ND          | 200kVA                     | 3                    | 22kW                 |
|     | Birmingham New Street (short Stay)          | Birmingham New Street Station, Queens Dr, Birmingham B2 4ND          | 506kVA                     | 23                   | 22kW                 |
| 2   | Chippenham                                  | Cocklebury Road, Chippenham, SN15 3QH                                | 616kVA                     | 28                   | 22kW                 |
| 3   | Chislehurst                                 | South East House, Chislehurst, BR7 5NN                               | 220kVA                     | 10                   | 22kW                 |
| 4   | Clapham Junction                            | St John's Hill, Clapham, Greater London, SW11 2QP.                   | 110kVA                     | 5                    | 22kW                 |
| 5   | Dartford Car Park                           | Victoria Road, Dartford, DA1 5AJ                                     | 330kVA                     | 15                   | 22kW                 |
| 6   | Droitwich Spa                               | Off Union Ln, Droitwich WR9 9BD                                      | 132kVA                     | 6                    | 22kW                 |
| 7   | Letchworth Garden City                      | Letchworth Garden City, Station Road, Letchworth SG6 3AN             | 220kVA                     | 10                   | 22kW                 |
| 8   | Liverpool Lime Street                       | Station Car Park, Lord Nelson Street, L3 5QB                         | 660kVA                     | 30                   | 22kW                 |
| 9   | Llandudno Station                           | Augusta Street, Llandudno, LL30 2AF                                  | 528kVA                     | 24                   | 22kW                 |
| 10  | London Paddington                           | Bishop's Bridge Rd, London W2 6AA                                    | 484kVA                     | 22                   | 22kW                 |
| 11  | London Victoria                             | Victoria Station, Eccleston Bridge, Victoria, London SW1W 9SJ        | 308kVA                     | 14                   | 22kW                 |
| 12  | London Waterloo                             | Station Approach Rd, South Bank, London SE1 8SW                      | 220kVA                     | 10                   | 22kW                 |
| 13  | Manchester Piccadilly (Short Stay and Taxi) | Manchester Piccadilly Station, Station Approach, Manchester, M60 7RT | 250kVA                     | 5                    | 50kW                 |

|                                                                 |
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|    |                        |                                                                         |         |     |      |
|----|------------------------|-------------------------------------------------------------------------|---------|-----|------|
| 14 | Milton Keynes Quadrant | Network Rail, The Quadrant, Elder Gate, Milton Keynes Quadrant, MK9 1EN | 2200kVA | 100 | 22kW |
| 15 | Uckfield               | High Street, TN22 1HS, Uckfield                                         | 616kVA  | 28  | 22kW |
| 16 | Walsall Car Park       | Station St, Walsall WS2 9JZ                                             | 220kVA  | 10  | 22kW |
| 17 | Welwyn Garden City     | Osborn Way, Welwyn Garden City AL8 6TU                                  | 902kVA  | 41  | 22kW |
| 18 | Whitstable             | Railway Ave, Whitstable CT5 1LL                                         | 176kVA  | 8   | 22kW |
| 19 | Wigan Wallgate         | Wigan Wallgate Station, Wigan WN1 1BB                                   | 264kVA  | 12  | 22kW |

**Table 4. List of Sites with Power Requirement**

|                                                                 |
|-----------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b>      |
| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

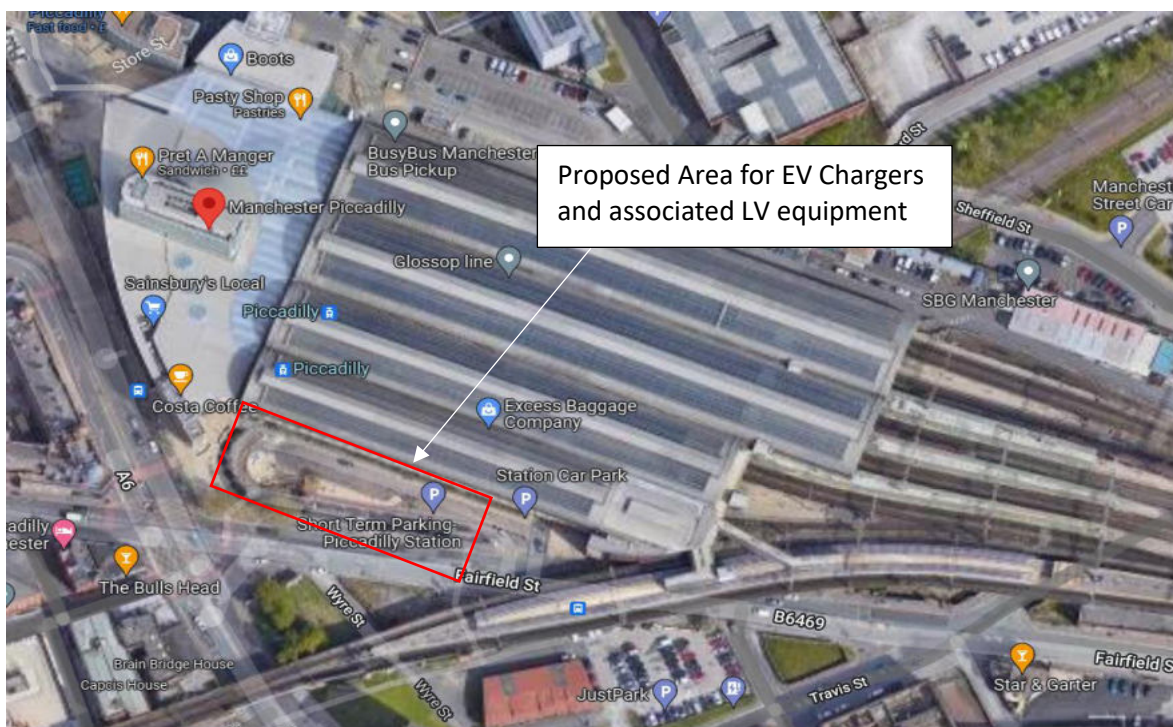
| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

## 6 Existing Conditions

### 6.1 Description of Site

Manchester Piccadilly Station Short Stay Car Park is located at M60 7RT. The proposed EV chargers will be installed at the car park which is located next to the Manchester Piccadilly railway station on Fairfield Street (see Figure 1).

Access and egress of car park is via the southeast entrance/exit from the Fairfield Street. Currently, no existing EV charging infrastructure has been found on-site. There are existing LV Panels – LV Panel 1 and LV Panel 2 (Ref: MSB01-01 and MSB01-02) within the Arch 154 HV Switchroom to supply the entire station electrical loads including the electrical loads within the short stay car park. There is also an internal LV Switchroom, next to the short stay car park and the station metro link area, however, the existing DB (Ref: NSB04) within this LV Switchroom is noted to be insufficient to supply to the downstream EV charger. Therefore, as discussed and agreed, the existing LV Panel (Ref: MSB-01-01) will be utilised to feed the downstream EV charging infrastructures.



**Figure 1 - Location of Manchester Piccadilly Short Stay Station APCOA Car Park**

|                                                                 |
|-----------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b>      |
| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
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**Figure 2 – Entrance and Exit of Manchester Piccadilly Short Stay Car park**

## 7 Overall Proposed Works

All 5No. EV chargers including 1No. DDA Bay EV charger proposed within the short stay car park will be supplied from the existing LV supply. 1No. feeder pillar shall be supplied from the existing LV panel (Ref: MSB01-01) within the Arch 154 HV room. As instructed by NR project team, no further considerations for future proofing of the carpark are to be undertaken.

### 7.1 Power Requirement

Power feasibility options to supply the proposed EV Charging infrastructure have been assessed and suitable option has been identified at GRIP 3 stage. As discussed and agreed with NR, the existing LV panel (Ref: MSB01-01) has sufficient spare capacity which will feed the downstream proposed EV Chargers.

Proposed cable will exit the feeder pillar into the underground trench then routed to the proposed Stakka box via proposed ducts to the respective EV chargers. Proposed cable type and size will be validated at GRIP 5 stage.

To accommodate 5No. 50kW EV Chargers at full rating, 250kW power will be required. As discussed and agreed with NR DPE in the signed A1 [Ref. 6], these rapid EV charger will be load-managed with others in order not to exceed the permissible load i.e. for a 400A supply from the existing LV Panel, only 3No. rapid chargers to charge at full capacity at 375A at 50kW when these chargers are engaged. However, load management will begin once the 4<sup>th</sup> rapid charger is in used.

|                                                                 |
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|---------------------------|-----------------|---------------|---------------|-------------------|---------|
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## 7.2 LV Infrastructure

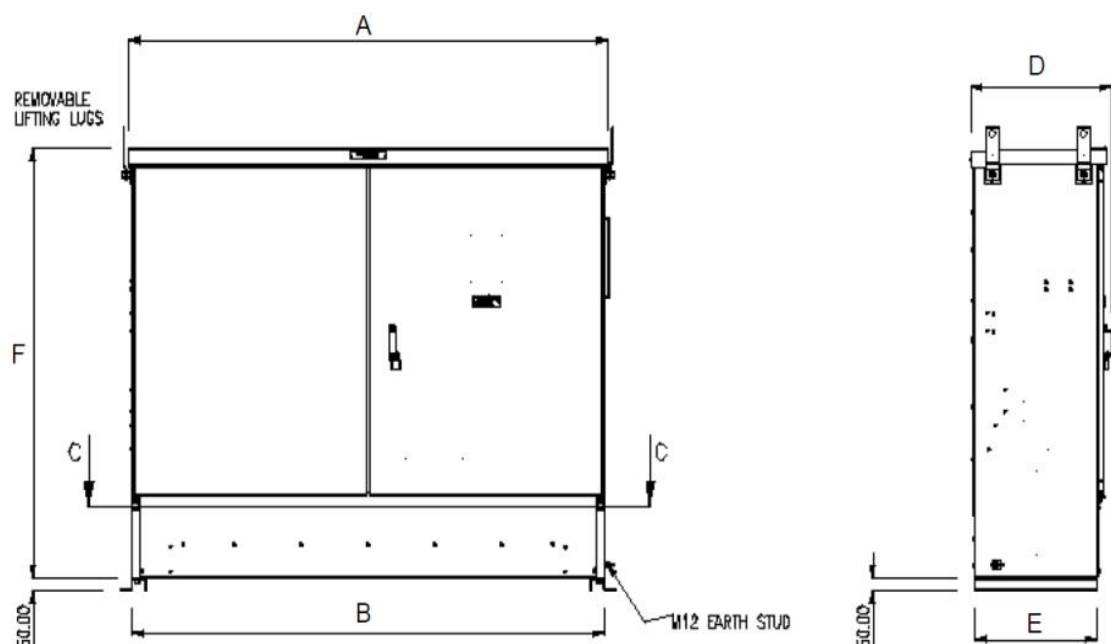
### 7.2.1 Existing LV Panel (Ref: MSB01-01)

The existing LV Panel (Ref: MSB01-01) within the Arch 154 HV Switchroom has been selected to supply the proposed EV charging infrastructure within the short stay car park area. Spare capacity at the LV Panel outgoing breaker (Ref: Section F17) has also been identified during the site survey and will need to be modified to feed the downstream EV charging infrastructure. Details of the breaker modification will be confirmed at GRIP 5 stage. During the IDC / IDR meeting on 26/04/2022, the design team has been notified that there is an installation of a new equipment behind this LV panel. However, as there is no information of the new installation available at this stage, it has been assumed that the newly installed equipment has no impact on the proposed modification to the LV Panel.

### 7.2.2 Proposed Feeder Pillar

The proposed feeder pillar shall be designed to accommodate the proposed rapid EV chargers. Due to the space constraints within the existing LV switchroom next to the short stay car park, this feeder pillar has been proposed on the short stay car park. Since the location of the proposed feeder pillar at public area, the feeder pillar shall be vandal-proof, an IP-rated enclosure and shall also be suitable to be installed in public space without any supplementary protection. This feeder pillar should also be designed to have a sloping roof to prevent littering.

Each EV charger outgoing circuit shall be fed via a suitably rated MCB with a neutral-isolating RCCB. Protection settings will need to be provided via AMTECH calculations at GRIP 5 stage. 20% spare capacity has also been allowed on the outgoing of the feeder pillar. However, these details will need to be confirmed at GRIP 5 Stage based on site-specific DNO supply information.



**Figure 4: Proposed Feeder Pillar**

|                                                                 |
|-----------------------------------------------------------------|
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### 7.2.3 Compleo CITO BM 500 Rapid EV Charger

The proposed EV charger shall be Compleo CITO BM 500 50kW TPN, integrated with 4G communications and open protocol. The CITO BM 500 charger shall have a configuration of 2 in 1 - CCS and CHAdeMO sockets, MODE 4 where only 1No. vehicle will be charged at any time with a max DC charge current of 125A. This rapid charger shall either be mounted on a concrete base or ground mounted. The dimension of the Innogy eBox charger is 1995mm (H) x 640mm (W) x 511mm (D).

As confirmed with the EV charger manufacturer and agreed with NR's response as per TQ – 14 (172768-KCL-TQN-EDS-000014), the maximum allowable supply cable size is 95sq.mm to supply the rapid charger. However, cable calculations will need to be carried out via AMTECH calcs to confirm the types and sizes of all cables at GRIP 5 (Detailed design) stage.



**Figure 5: CITO BM 500 Rapid EV Charger**

### 7.2.4 Proposed EV Charging Arrangement

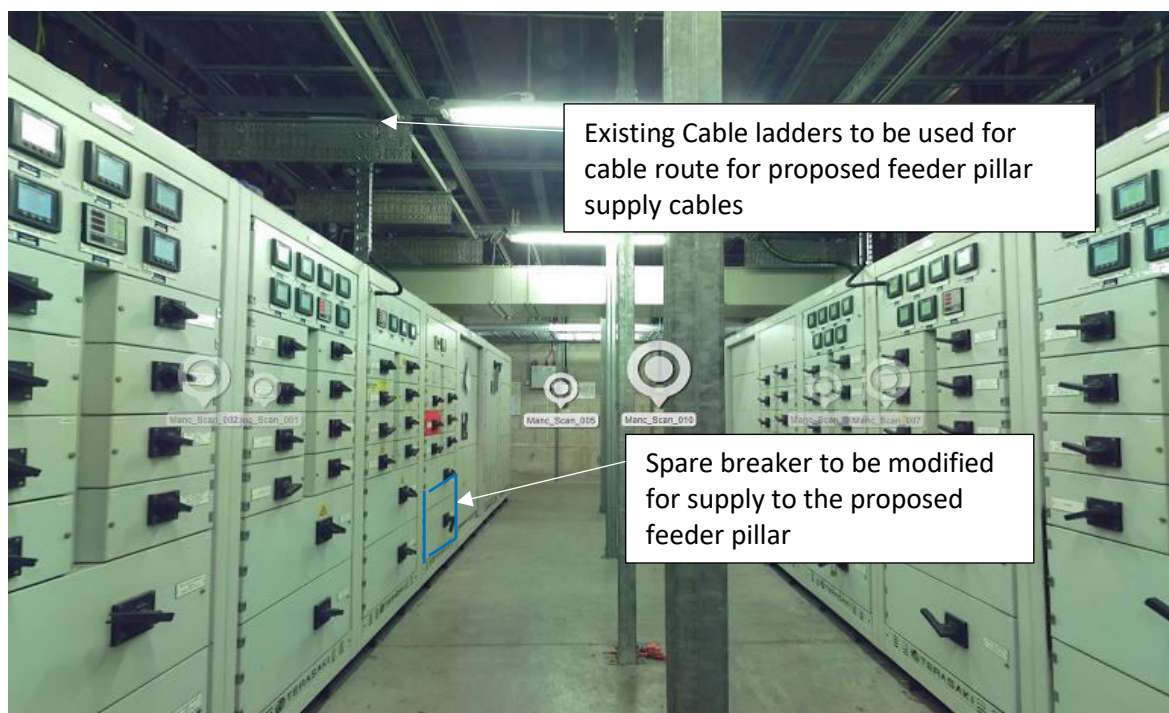
From the existing LV panel (Ref: MSB01-01), proposed LV cables to the proposed feeder pillar will be routed on the existing high level cable ladder out of the Arch 154 HV switchroom (see Figure 6). At the external area of the switchroom, new cable trays are proposed at high level and routed below the ceiling of the undercroft area and above the metro station before routed on the existing cable trays (see Figure 7). Due to the lack of survey information at the area between the undercroft and the short stay car park, it has been assumed that there are existing high level cable trays and these cable trays will have sufficient space capacity to route the proposed feeder pillar supply cables (see Figure 8). This arrangement will need to be validated at GRIP 5 stage once detailed survey has been carried out.

Once the cables comes to the short stay car park, the cables will be routed from the existing high level cable tray onto a proposed cable tray before routed into the ground. Underground duct route and proposed stakka box cable chambers have been provided in the design to the proposed feeder pillar (see Figure 9). The LV cables for all 5No. EV Chargers including 1No. DDA bays EV charger will be routed from the feeder pillar back to the stakka box cable chamber via underground duct route before terminating to their

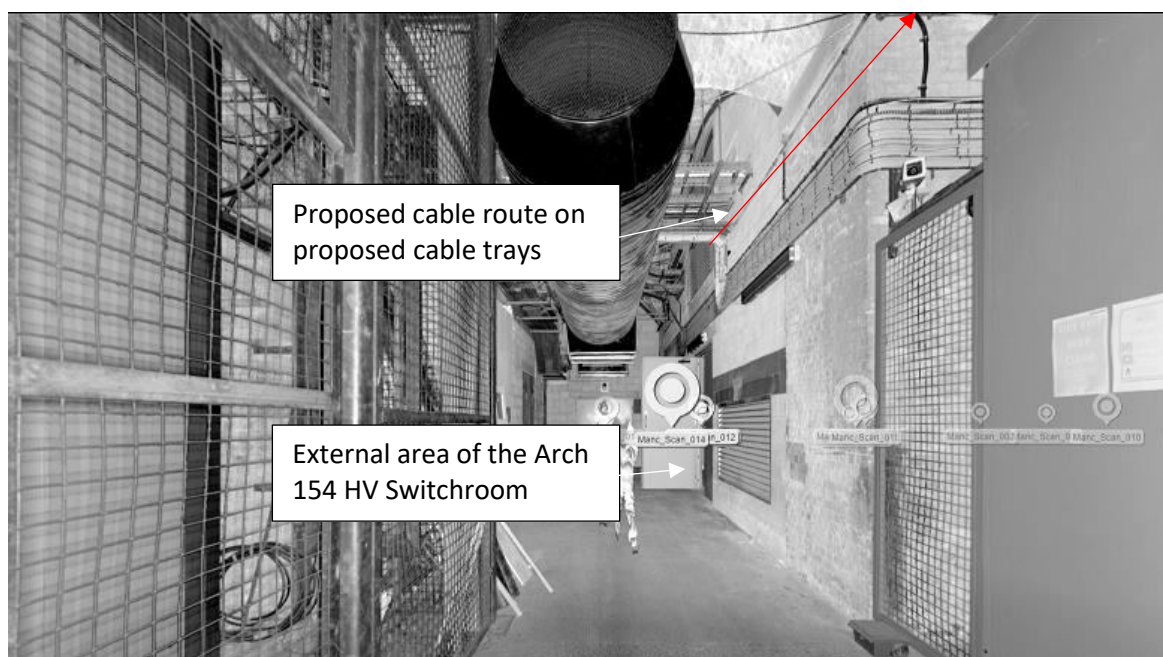
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| <b>C0033 – Network Rail EV Charging Point Installation</b>      |
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corresponding EV chargers (see Figure 10 & 11). Refer to drawing - 172768-KCL-DRG-EDS-000138 for proposed cable routes. Cable calculations will be carried out to confirm the sizes of all cables at GRIP 5 stage.



**Figure 6: Spare MCCB (Ref: Section F17) within existing LV Panel to be modified**



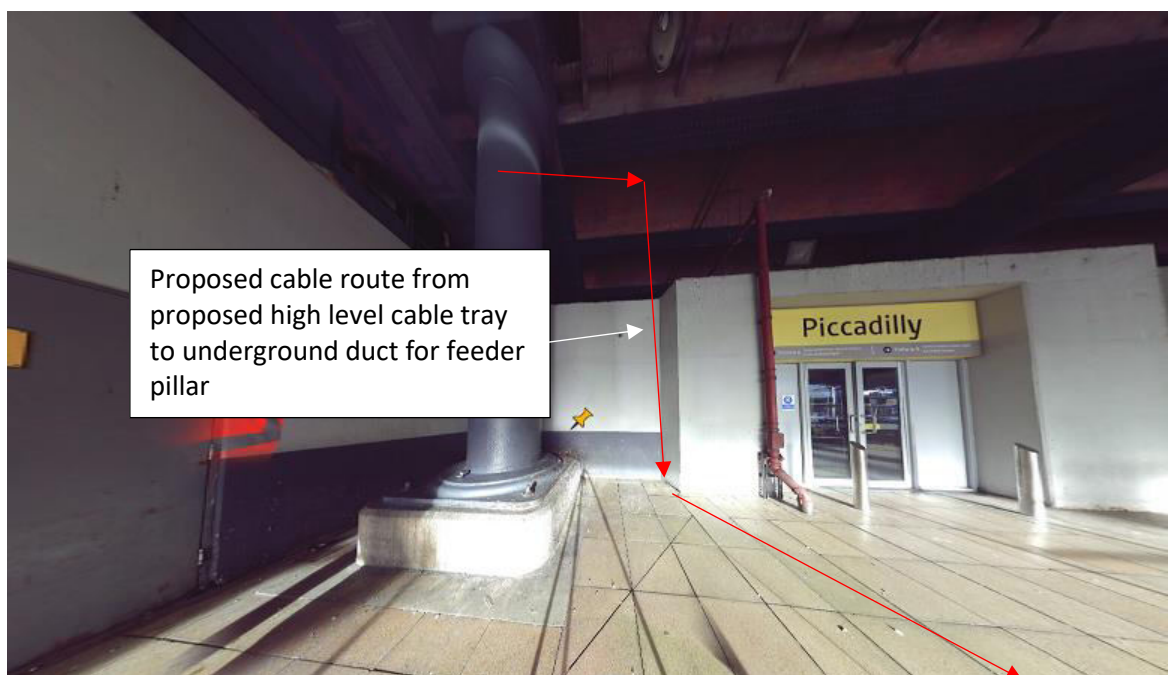
**Figure 7: External area of Arch 154 HV Switchroom**

|                                                                 |
|-----------------------------------------------------------------|
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| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
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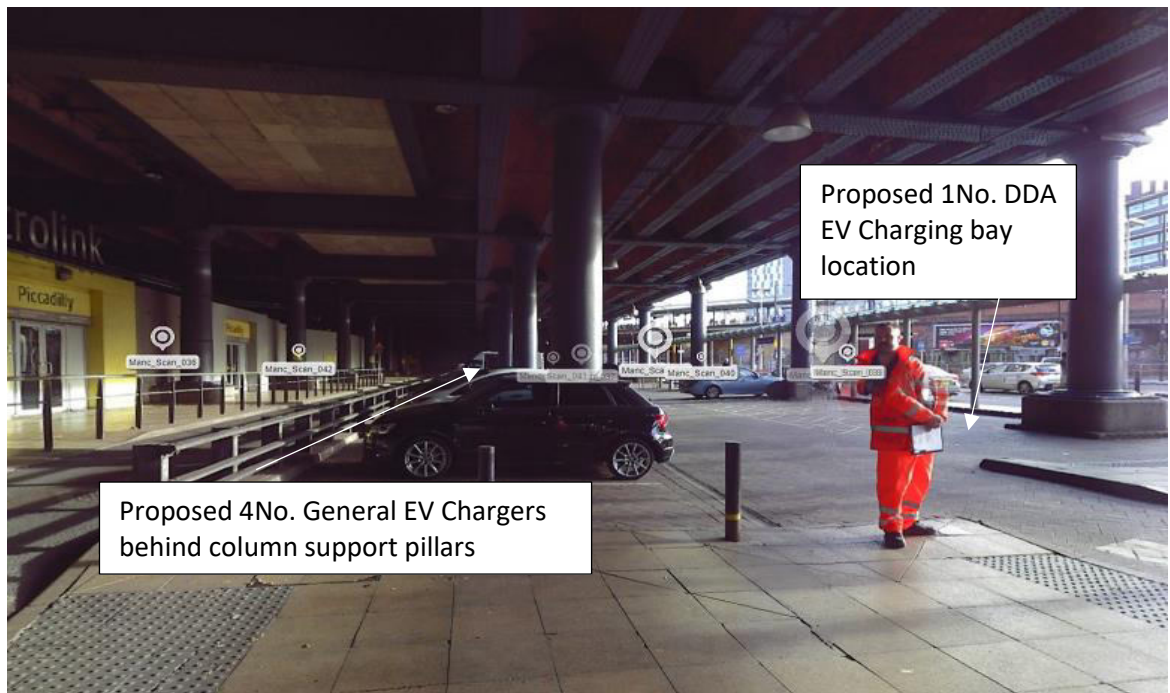
**Figure 8: Existing Undercroft area**



**Figure 9 – Location of cable route from high level cable trays to underground ducts**

|                                                                 |
|-----------------------------------------------------------------|
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| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |



**Figure 10 – Location of General EV Charging Bays**



**Figure 11 – Location of proposed feeder pillar and DDA Bay**

## 8 Additional Works

### 8.1 Electromagnetic Compatibility (EMC)

All cables are routed in a way that would not introduce any electromagnetic interferences.

|                                                                 |
|-----------------------------------------------------------------|
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| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

| Document Reference Number |                 |               |               |                   |         |
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| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
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## 8.2 Alternative Solutions to the Remit Considered

Not applicable.

## 8.3 Product Acceptance Requirements

To be confirmed by NR.

## 8.4 Outline IDC/IDR Plan

The IDC/IDR for this design submission was undertaken on 26<sup>th</sup> April 2022.

## 8.5 Design Criteria

### 8.5.1 Equipment Support Structure

Refer to 172768-KCL-F01-ECV-000016 – Civils Form 001 [Ref 1].

### 8.5.2 Lighting Systems

The feeder pillar enclosure shall have compliant task lighting. Details shall be provided at GRIP 5. As the lighting requirement for proposed EVC area is sufficient, no additional lighting will be required for the proposed EVC area.

### 8.5.3 Earthing, Bonding and Lightning Protection Systems

Since the earthing supply is assumed to be a TN-S supply as per NR's response on TQ-09 (Ref: 172768-KCL-ETQ-EDS-000009), 2No. CPC connection for the proposed feeder pillar will be connected to the existing earth bar within the HV Switchroom. Refer to Appendix F for details of the existing earthing arrangement. Detailed earthing and bonding details will be validated at the GRIP 5 Stage.

Bonding connection is assumed to be available on all the existing metallic infrastructure (i.e. metallic barriers, existing pipeworks, existing metallic cable trays etc.). If there is no existing bonding connections, then connections will need to be made for the existing metallic infrastructure.

All existing metallic equipment will need to be bonded to the proposed metallic equipment (i.e. protection bollards, CITO EV chargers casing etc.) in close proximity to avoid touch potential difference. The closest metallic infrastructure to the proposed feeder pillar will need to be bonded back to the feeder pillar MET. Bonding conductor sizes will be determined at GRIP 5 stage upon completion of AMTECH calculations.

It has been assumed that the existing lightning protection is as per the latest applicable standards and the proposed installation of EV Chargers and associated equipment does not need any additional design consideration for lightning risk. Coordination and incorporation of any additional lightning protection measures will be undertaken at GRIP 5.

## 8.6 Design Life

The life expectancy of the new system shall be in accordance with Network Rail's minimum requirements of 20 years for E&P equipment.

In order to achieve the life expectancy of the equipment used, it is assumed that regular planned maintenance will be carried out at the correct intervals recommended by the manufacturer or specialist.

## 8.7 Departures/Deviations from Design Standards

None envisaged.

|                                                                 |
|-----------------------------------------------------------------|
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## 9 Construction Strategy

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Since the feeder pillar enclosure unit is proposed to be installed on the car park, no height limit precaution is required. The EV Chargers equipment will be delivered to the site by road into the carpark. Bays to be upgraded shall be surrounded with temporary tall fences to avoid visual impact or any disturbances to the public during installation of associated equipment.

## 10 Testing and Commissioning Strategy

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The Contractor shall test the installed system and record the results formally. The results will be issued to Network Rail. In particular, the contractor shall notify NR immediately of any failures/shortfalls. Any changes shall be agreed with Network Rail and on-site details are to be added to the drawings.

|                                                                 |
|-----------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b>      |
| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

## APPENDIX A – DESIGNER’S RISK ASSESSMENT

---

| Document Number        | eB Number                | Document Title                                                       |
|------------------------|--------------------------|----------------------------------------------------------------------|
| C0033-POI-RA-EP-140001 | 172768-KCL-RA-EDS-000014 | Manchester Piccadilly Short Stay Car Park Designer’s Risk Assessment |

|                                                                 |
|-----------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b>      |
| <b>Manchester Piccadilly Short Stay Car Park E&amp;P Form A</b> |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A01     |

## APPENDIX B – ASSUMPTIONS REGISTER

| Document Number         | eB Number                 | Document Title                                                 |
|-------------------------|---------------------------|----------------------------------------------------------------|
| C0033-POI-REG-EP-140001 | 172768-KCL-REG-EDS-000013 | Manchester Piccadilly Short Stay Car Park Assumptions Register |

|                                                            |
|------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b> |
| <b>Manchester Piccadilly Short Stay Car Park Form A</b>    |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

## APPENDIX C – ELECTRICAL DRAWINGS

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| Drawing Number          | eB Number                 | Document Title                                                            |
|-------------------------|---------------------------|---------------------------------------------------------------------------|
| C0033-POI-DRG-EP-140001 | 172768-KCL-DRG-EDS-000138 | Manchester Piccadilly Short Stay Car Park Proposed General Arrangement    |
| C0033-POI-DRG-EP-140002 | 172768-KCL-DRG-EDS-000139 | Manchester Piccadilly Short Stay Car Park Proposed Single Line Diagram    |
| C0033-POI-DRG-EP-140003 | 172768-KCL-DRG-EDS-000140 | Manchester Piccadilly Short Stay Car Park Proposed Earthing Block Diagram |

|                                                                |
|----------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging<br/>Point Installation</b> |
| <b>Manchester Piccadilly Short Stay Car<br/>Park Form A</b>    |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
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## APPENDIX D – IDC / IDR CERTIFICATE

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|                                                                                                         |                                                                                    |                       |                        |            |       |     |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------|------------------------|------------|-------|-----|
| <br><b>Page 1 of 10</b> | <b>Combined Interdisciplinary Check &amp; Interdisciplinary Review Certificate</b> |                       |                        |            |       |     |
|                                                                                                         | Form Ref                                                                           | NR/L2/RSE/02009/F0047 | OFFICIAL<br>Issue Date | 06/03/2021 | Issue | 4.0 |

|                                                                                                       |                                                     |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>INTERDISCIPLINARY CHECK (IDC) &amp; REVIEW (IDR) CERTIFICATE:</b>                                  |                                                     |
| Project/Programme/Portfolio No: <b>172768</b>                                                         | Phase(s)/Stage(s): <b>GRIP 4</b>                    |
| Project/Programme/Portfolio Title: <b>Phase 2 Grip 1-4 EV Charging Points – Manchester Piccadilly</b> | Certificate No:<br><b>172768-KCL-IDC-DEL-000012</b> |

|                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DESCRIPTION OF DESIGN BEING REVIEWED:</b>                                                                                                                                                       |
| <p>Civils and Electrical design for Provision of Electric Vehicle Charging Points at Manchester Piccadilly APCOA car park. Fairfield Street.</p> <p>GPS - 53.476708323293, -2.2306385745318535</p> |

| DISCIPLINE CHECKED       | DESCRIPTION CHECKED AGAINST |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
|--------------------------|-----------------------------|-------------------|--------------------------|------------|------------|----------------------|-----------------|-----|-------|------------|---------|----------|-------|
|                          | Buildings                   | Civil Engineering | Construction and Staging | Earthworks | Ergonomics | ETE / Contact System | Level Crossings | OLE | Plant | Signalling | Systems | Telecoms | Track |
| Buildings                |                             |                   |                          |            |            |                      |                 |     | X     |            |         |          |       |
| Civil Engineering        |                             |                   |                          |            |            |                      |                 |     | X     |            |         |          |       |
| Construction and Staging |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Earthworks               |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Ergonomics               |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| ETE / Contact System     |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Level Crossings          |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| OLE                      |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Plant                    | X                           | X                 |                          |            |            |                      |                 |     |       |            |         |          |       |
| Signalling               |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Systems                  |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Telecoms                 |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |
| Track                    |                             |                   |                          |            |            |                      |                 |     |       |            |         |          |       |

**Note:** Disciplines/technical specialists may need to be added to complete an Interdisciplinary check. The CEM shall update the list to include all checking requirements including existing infrastructure.

|                                                                                                         |                                                                                    |                              |                                |                   |              |            |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------|--------------------------------|-------------------|--------------|------------|
| <br><b>Page 2 of 10</b> | <b>Combined Interdisciplinary Check &amp; Interdisciplinary Review Certificate</b> |                              |                                |                   |              |            |
|                                                                                                         | <b>Form Ref</b>                                                                    | <b>NR/L2/RSE/02009/F0047</b> | <b>OFFICIAL<br/>Issue Date</b> | <b>06/03/2021</b> | <b>Issue</b> | <b>4.0</b> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HEALTH AND SAFETY BY DESIGN STATEMENT:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p>We the undersigned certify that the designs documents and drawings listed on the attached schedule(s) in respect of the above project have been the subject of a safety review accounting for the ORR Strategy for regulation of health and safety risks - Chapter 12: Health and Safety by Design, and NR Life Saving Rules.</p> <p>This review assumes all required design checks, in accordance with all relevant legislation in force; including Railway Group and Network Rail Company Standards have been carried out by the relevant design organisation(s).</p> |
| <b>IDC STATEMENT:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>We the undersigned certify that the drawings listed on the attached schedule(s) in respect of the above project have been the subject of an Interdisciplinary Check, undertaken to eliminate areas of discrepancy between disciplines and existing infrastructure. This check assumes normal design checks, in accordance with the relevant British, European, Railway Group and Network Rail Company Standards have been carried out by the relevant design organisation(s).</p>                                                                                       |
| <b>IDR STATEMENT:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>We the undersigned certify that the drawings listed on the attached schedule(s) in respect of the above project have been the subject of an Interdisciplinary Review, undertaken to eliminate areas of discrepancy between disciplines and existing infrastructure.</p>                                                                                                                                                                                                                                                                                                 |

| CONTRACTOR'S ENGINEERS (CRE's) RESPONSIBLE FOR INTERDISCIPLINARY CHECK |            |              |                |                                                                                       |          |
|------------------------------------------------------------------------|------------|--------------|----------------|---------------------------------------------------------------------------------------|----------|
| Discipline/Function                                                    | Contractor | Name         | Title          | Signature                                                                             | Date     |
| Buildings                                                              |            |              |                |                                                                                       |          |
| Civil Engineering                                                      | Poise      | Gurjit Bahia | CRE Civils     |  | 28.04.22 |
| Construction and Staging                                               |            |              |                |                                                                                       |          |
| Earthworks                                                             |            |              |                |                                                                                       |          |
| Ergonomics                                                             |            |              |                |                                                                                       |          |
| ETE / Contact System                                                   |            |              |                |                                                                                       |          |
| Level Crossings                                                        |            |              |                |                                                                                       |          |
| OLE                                                                    |            |              |                |                                                                                       |          |
| Plant                                                                  | Poise      | Naeem Riaz   | CRE Electrical |  | 28.04.22 |
| Signalling                                                             |            |              |                |                                                                                       |          |
| Systems                                                                |            |              |                |                                                                                       |          |
| Telecoms                                                               |            |              |                |                                                                                       |          |
| Track                                                                  |            |              |                |                                                                                       |          |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>I certify that all reasonable professional skill and care have been used in the Interdisciplinary Check described above.</p> <p>I certify that individuals undertaking this Interdisciplinary Check are suitably qualified and competent to carry out these duties.</p> <p>I certify that all design and integration requirements in accordance with Health and Safety by Design principles have been carried out.</p> <p>I confirm that all required interfacing deliverables were present at the review, or any deliverables omitted were considered for significance and noted on the review comments.</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                         |                                                                                    |                       |                        |            |       |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------|------------------------|------------|-------|
| <br><b>Page 3 of 10</b> | <b>Combined Interdisciplinary Check &amp; Interdisciplinary Review Certificate</b> |                       |                        |            |       |
|                                                                                                         | Form Ref                                                                           | NR/L2/RSE/02009/F0047 | OFFICIAL<br>Issue Date | 06/03/2021 | Issue |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                              |                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|----------------|
| (To be completed by the Contractor's Engineering Manager).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                              |                |
| Name:<br>Prem Hari                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Signature:  | Date: 28/04/22 |
| I confirm that all the relevant disciplines HAVE / <del>HAVE NOT</del> * satisfactorily completed The IDC Process on the above documents and the Process IS / <del>IS NOT</del> * complete (process is complete when all items are closed).<br><b>Note:</b> Where a required discipline/function has not been represented, a note identifying the omission(s) is to be included in the issue comments. The deliverable may not proceed until all required representation has been undertaken.<br>(To be completed by the Contractor's Engineering Manager). |                                                                                              |                |
| Comments Attached <del>YES</del> / NO*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                              |                |
| Name:<br>Prem Hari                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Signature:  | Date: 28/04/22 |

**Note:** This sheet to be attached to office copy of the Design Drawing and Network Rail Acceptance Review copy.

| NETWORK RAIL STAFF RESPONSIBLE FOR INTERDISCIPLINARY REVIEW |              |           |           |      |
|-------------------------------------------------------------|--------------|-----------|-----------|------|
| Discipline/Function                                         | Name         | Title     | Signature | Date |
| Buildings                                                   |              |           |           |      |
| Civil Engineering                                           | Katie Forbes | Civils PE |           |      |
| Construction                                                |              |           |           |      |
| Earthworks                                                  |              |           |           |      |
| Ergonomics                                                  |              |           |           |      |
| ETE / Contact System                                        |              |           |           |      |
| Level Crossings                                             |              |           |           |      |
| Maintenance                                                 |              |           |           |      |
| OLE                                                         |              |           |           |      |
| Operations                                                  |              |           |           |      |
| Plant                                                       | Usman Khan   | DPE       |           |      |
| Signalling                                                  |              |           |           |      |
| Systems                                                     |              |           |           |      |
| Telecoms                                                    |              |           |           |      |
| Track                                                       |              |           |           |      |

|                                                                                                                                                                                                                                                                                                                        |            |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|
| I certify that all reasonable professional skill and care have been used in the Interdisciplinary Review described above. I certify that individuals undertaking the Interdisciplinary Review are suitably qualified and competent to carry out these duties.<br>(To be completed by the Designated Project Engineer). |            |       |
| DPE Name:                                                                                                                                                                                                                                                                                                              | Signature: | Date: |

|                                                                                                         |                                                                                    |                       |                        |            |       |     |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------|------------------------|------------|-------|-----|
| <br><b>Page 4 of 10</b> | <b>Combined Interdisciplinary Check &amp; Interdisciplinary Review Certificate</b> |                       |                        |            |       |     |
|                                                                                                         | Form Ref                                                                           | NR/L2/RSE/02009/F0047 | OFFICIAL<br>Issue Date | 06/03/2021 | Issue | 4.0 |

**SCHEDULE OF DRAWINGS - The IDC / IDR was carried out with reference to the following design drawings.**

| Category | Description                                                                                                                                                                                                             |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1        | Accepted – Proceed to the next stage in the process.                                                                                                                                                                    |
| 2        | Accepted – Proceed to the next stage in the process subject to the design being updated to the attached comments and an updated copy being submitted to the DPE for records.                                            |
| 3A       | Rejected – Do not proceed the design is to be amended and reissued; recommence the IDC and IDR process; the Acceptance Review of the resubmitted design will only review the update to the comments raised.             |
| 3B       | Rejected - Do not proceed the design is to be amended and reissued; recommence the IDC and IDR process; the Acceptance Review of the resubmitted design will consider the entire design as if it were a new submission. |
| 4        | Note.                                                                                                                                                                                                                   |

| No. | Document No.                              | Revision | Document Title                                                                            | Cat |
|-----|-------------------------------------------|----------|-------------------------------------------------------------------------------------------|-----|
| 1   | <a href="#">172768-KCL-DRG-ECV-000131</a> | P01      | Manchester Piccadilly Station Short Stay Car Park - Proposed Site Arrangement             | 2   |
| 2   | <a href="#">172768-KCL-DRG-ECV-000132</a> | P01      | Manchester Piccadilly Station Short Stay Car Park - Proposed Site Arrangement             | 2   |
| 3   | <a href="#">172768-KCL-DRG-EDS-000138</a> | P01      | PROPOSED EV CHARGING INFRASTRUCTURE MANCHESTER PICCADILLY CAR PARK GENERAL ARRANGEMENT    | 2   |
| 4   | <a href="#">172768-KCL-DRG-EDS-000139</a> | P01      | MANCHESTER PICCADILLY - EV CHARGING INFRASTRUCTURE PROPOSED - SINGLE LINE DIAGRAM         | 2   |
| 5   | <a href="#">172768-KCL-DRG-EDS-000140</a> | P01      | MANCHESTER PICCADILLY CAR PARK EV CHARGING INFRASTRUCTURE PROPOSED EARTHING BLOCK DIAGRAM | 2   |
|     |                                           |          |                                                                                           |     |

**Note:** This sheet to be attached to office copy of the Design Drawing.

| SCHEDULE OF INTERFACE ISSUES |                                                                                                                                                                                                                         |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Category                     | Description                                                                                                                                                                                                             |
| 1                            | Accepted – Proceed to the next stage in the process.                                                                                                                                                                    |
| 2                            | Accepted – Proceed to the next stage in the process subject to the design being updated to the attached comments and an updated copy being submitted to the DPE for records.                                            |
| 3A                           | Rejected – Do not proceed the design is to be amended and reissued; recommence the IDC and IDR process; the Acceptance Review of the resubmitted design will only review the update to the comments raised.             |
| 3B                           | Rejected - Do not proceed the design is to be amended and reissued; recommence the IDC and IDR process; the Acceptance Review of the resubmitted design will consider the entire design as if it were a new submission. |
| 4                            | Note.                                                                                                                                                                                                                   |

| Document No.              | Issue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Category | Raised by | Response by | Date Due | Date Closed |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|-------------|----------|-------------|
| 172768-KCL-DRG-ECV-000131 | <p>TB – Indicated that there is new switchgear installed behind the HV panel proposed for us to utilise which may impede access .</p> <p>CB – noted that there are several (4) panels that could supply the equipment so if the proposed panel doesn't work in relation to the new equipment then other options can be considered.</p> <p>TB – Will send updated photographs and the access strategy for installation will need to be considered by the team at Grip 5.</p> <p><b>Action</b><br/> UK to review the new equipment location and accessibility for the cable route out of the proposed panel. Caveats may need to be added to the design – to be picked up at DRN</p> <p>TB – Will send updated photos showing new equipment.</p> | 4        | TB        | UK          | 03/05/22 |             |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |           |              |                 |               |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|--------------|-----------------|---------------|
| <p>172768-KCL-DRG-ECV-000131</p> | <p>UK queried whether the LV panel being adjacent to the ticket machines would be an issue to the Station.</p> <p>TB – indicated that visually the cabinet would be preferred back to back with the existing ticket machines.</p> <p>CB/GB – Indicated that it had been installed at 90 degrees with the existing ticket machines to allow for bending radius for the cables, excavation and to allow sufficient maintenance space and for a place of safety for the maintenance.</p> <p>TB – Queried what the material would be for the panel.</p> <p>NC – indicated that the preferred option would be a metalclad cabinet.</p> <p>TB – indicated that a stainless steel maybe preferable and that the Station Planners would need to be consulted on this.</p> <p><b>Action</b><br/>UK/UM – To liaise with the Town planners to issue the G4 design and confirm if this proposal is acceptable. Any comments to be added to the DRN.</p> | <p>4</p> | <p>TB</p> | <p>UK/UM</p> | <p>03/05/22</p> |               |
| <p>172768-KCL-DRG-ECV-000132</p> | <p>KF – Raised the fact that security could be an issue with cabinets being so close together.</p> <p>GB – Indicated that a note can be added on the drawings for this to be explored further at Grip 5.</p> <p><b>Action</b><br/>GB to add a note to the drawing indicating that adequate security protection to be added at Grip to prevent litter, secretion of items etc between equipment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>2</p> | <p>KF</p> | <p>GB</p>    | <p>06/05/22</p> |               |
| <p>172768-KCL-DRG-ECV-000132</p> | <p>SP – queried why we don't hatch the dead space around the pillar.</p> <p>GB – Assumption is that the column causes a visual blocker.</p> <p>CB – Noted that it is not a requirement to have all 3 sides hatched which is why it was not undertaken.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>4</p> | <p>SP</p> | <p>CB/GB</p> | <p>n/a</p>      | <p>CLOSED</p> |

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |    |       |          |        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-------|----------|--------|
| 172768-KCL-DRG-ECV-000132 | SP queried why the chargers weren't behind the spaces.<br><br>CB indicated that there is no space with the existing fence/taxi rank road.                                                                                                                                                                                                                                                                                                                                                                    | 4 | SP | CB/GB | n/a      | CLOSED |
| 172768-KCL-DRG-ECV-000132 | KF queried if the layout drawings could all be orientated the same way round as 131 has north at the top of the page and 132 has it at the bottom of the page.<br>Electrical layout drawings are the same.<br><br>CB noted that this could be reviewed and updated at A01 for consistency, as this is not a technical error and is engineering preference only, then it's suggested that the drawings are to stay as there are. UK agreed this is the best approach mitigating against any programme delays. | 4 | KF | CB    | n/a      | CLOSED |
| 172768-KCL-DRG-ECV-000132 | KF queried the temporary works that might be required for install and that the Form 001 would need to indicate the likely requirement for temporary works across the metrolink building for CMS to be installed.<br><br><b>Action</b><br>Poise update the F001 with the likely temporary works required to be detailed at Grip 5/6                                                                                                                                                                           | 2 | KF | GB    | 06/05/22 |        |
| 172768-KCL-DRG-ECV-000132 | KF noted that any existing CMS being utilised across the metrolink would need to be verified at detailed design. Can a note be added to the risk/assumption register stating that all existing equipment being utilised is sufficient and should be surveyed.<br><b>Action</b><br>Update the assumptions/risks assessment to reflect this if not already within the DRA                                                                                                                                      | 2 | KF | GB    | 06/05/22 |        |
| 172768-KCL-DRG-ECV-000132 | KF noted that there are comms and foul water services shown in blue on the drawing. Are we affecting/amending these services.<br><br>GB – No these are shown in blue because the indicative cable route is likely to cross these services.<br><br><b>Action – Poise to check that all services shown in blue are interfaced with and make the notes clearer if possible.</b>                                                                                                                                 | 2 | KF | GB    | 06/05/22 |        |

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |    |     |          |        |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-----|----------|--------|
| 172768-KCL-DRG-ECV-000132 | KF when the cables leave the chamber, does there need to be 4 ducts leaving it or could there be 2 ducts leaving?<br><br>GB indicated that they were left separate for constructability and cable management but that this could be considered at Grip 5 stage.                                                                                                                                                                                                                              | 4 | KF | n/a | n/a      | CLOSED |
| 172768-KCL-DRG-ECV-000132 | TB – Queried the cable duct arrangement and numbers (should there be 6 cables to the DB enclosure).<br><br>GB/CB – indicated that the routes were indicative and could be expanded at detailed design once the cable calculations and cable schedule are undertaken at Grip 5 could be confirmed.                                                                                                                                                                                            | 4 | TB | n/a | n/a      | CLOSED |
| 172768-KCL-DRG-EDS-000139 | UK Queried what the arrangement would be for metering in terms of export devices – SMS meter.<br><br>NC – on the existing MCCB there is a meter.<br><br>UK – indicated that this may not be sufficient.<br><br>CB – indicated that the philosophy would need to be as per QMK<br><br>UK indicated that a Fiscal meter would need to be fixed to the front face of the LV panel/pillar.<br><br><b>Action</b><br><b>NC – Action add SMS fiscal meter to the drawings on the incoming side.</b> | 2 | UK | NC  | 06/05/22 |        |
| 172768-KCL-DRG-EDS-000140 | Assumption is that a TNS earthing arrangement is required and the drawing reflects this.                                                                                                                                                                                                                                                                                                                                                                                                     | 4 | NC | n/a | n/a      | CLOSED |
| General note              | UM to Liaise with the town planner and share the Grip 4 design and get their feedback/comments in the design review/DRN process.                                                                                                                                                                                                                                                                                                                                                             | 4 | UK | UK  | n/a      | CLOSED |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |    |     |          |        |

# **RECORD OF ATTENDANCE AT INTER-DISCIPLINARY CHECK & REVIEW MEETING:**

**Location: Teams**

**Date: 26/04/22**

| NAME            | COMPANY | PROJECT ROLE                             |
|-----------------|---------|------------------------------------------|
| Katie Forbes    | NWR     | Civils PE                                |
| Usman Khan      | NWR     | DPE                                      |
| Gurjit Bahia    | Poise   | Civils CRE                               |
| Nick Chung      | Poise   | Electrical Engineer                      |
| Nicola Tremayne | Kier    | Project Manager                          |
| Craig Brown     | Poise   | Lead Engineer                            |
| Janusz Wojcicki | NWR     | PE Electrical                            |
| Joshua White    | Poise   | Project co-ordinator                     |
| Naeem Riaz      | Poise   | Electrical CRE                           |
| Sam Puddephatt  | NWR     | Property Account Manager                 |
| Terry Bleasdale | NWR     | Utilities Specialist NW & Central Region |
| Steve Duffy     | NWR     | Project Manager                          |
| Prem Hari       | Poise   | CEM                                      |
| Deon Robinson   | NWR     | Engineer NW and Central                  |
| Kerry Collins   | Poise   | Project Manager                          |
|                 |         |                                          |

|                                                                                                                          |                                                                                     |                                                                                                              |                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  Nicola Tremayne                        |    |  Sam Puddephatt (External)  |  |
|  Craig Brown (External)                 |    |  Steve Duffy (External)     |  |
|  Deon Robinson (External)               |    |  Terry Bleasdale (External) |  |
|  Gurjit Bahia<br>External               |    |  Usman Khan (External)      |  |
|  Janusz Wojcicki (External)<br>External |    | Others invited (14)                                                                                          |                                                                                     |
|  Josh White (External)                  |    |  James Kelly                |                                                                                     |
|  Katie Forbes (External)                |    |  Nicholas Turner            |                                                                                     |
|  Kerry Collins (External)              |   |  Michael Cheadle            |                                                                                     |
|  Naeem Riaz (External)                |  |  James Woof               |                                                                                     |
|  Nick Chung<br>External               |  |  Andrew Ledger            |                                                                                     |
|  Prem Hari (External)                 |  |  David Sides              |                                                                                     |
|                                                                                                                          |                                                                                     |  Usha Mepani              |                                                                                     |

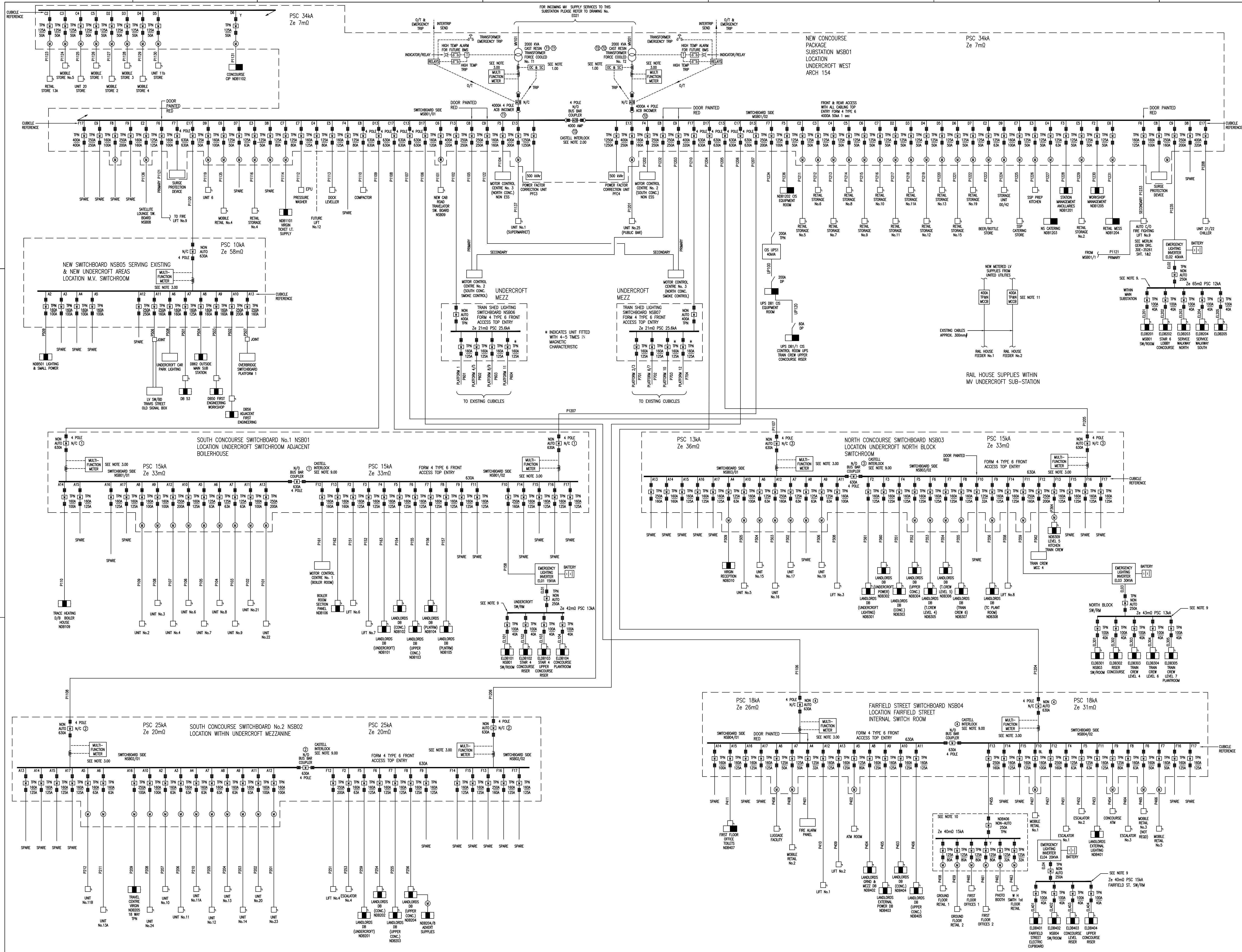
|                                                                                                       |
|-------------------------------------------------------------------------------------------------------|
|  Yaxye Ali         |
|  Peter Gee         |
|  Alex Lewis        |
|  Christopher White |
|  Emma Lawler       |
|  Michael Gradwell  |
|  Harry Chester     |

|                                                            |
|------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b> |
| <b>Manchester Piccadilly Short Stay Car Park Form A</b>    |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

## APPENDIX E – SINGLE LINE DIAGRAM PACKAGE SUBSTATION MSBO1

---



- NOTES:**
- 1.00 CASTELL TYPE INTERLOCKING IS PROVIDED ON PACKAGED SUBSTATION TRANSFORMER ENCLOSURE. SUCH THAT IT IS NOT POSSIBLE TO GAIN ACCESS TO THE TRANSFORMER UNLESS BOTH THE LOW VOLTAGE AND INCOMING CIRCUIT BREAKERS ARE SWITCHED OFF AND THE OUTGOING CIRCUIT BREAKER ON THE RING MAIN UNIT FEEDING THE TRANSFORMER IS SWITCHED OFF.
  - 2.00 CASTELL TYPE INTERLOCKING IS PROVIDED ON BOTH INCOMING CIRCUIT BREAKERS AND THE PACKAGED SUBSTATION BUS COUPLER SUCH THAT IT IS NOT POSSIBLE TO HAVE THE BUS COUPLER AND BOTH INCOMING ACB'S CLOSED. KEY T3 IS RELEASED VIA KEY EXCHANGE BOX ON WALL.
  - 3.00 MULTI-FUNCTION METERS INCLUDE THE FOLLOWING:-  
PHASE VOLTAGE  
LINE VOLTAGE  
CURRENT-EACH PHASE  
FREQUENCY  
POWER FACTOR  
KVA  
KVAR  
KWH  
KVARH
  - 4.00 SWITCHBOARDS ARE FORM 4 TYPE 6
  - 5.00 ALL MCCBs ARE FIXED PATTERN OF 50kA 1cu
  - 6.00 MCCBs 0-300A ADJUSTABLE THERMAL FIXED MAGNETIC MCCBs 400-630A ELECTRONIC THERMAL ADJUSTABLE MAGNETIC
  - 7.00 ALL SPARE COMPARTMENTS INDICATED ARE FULLY EQUIPPED
  - 8.00 CASTELL TYPE INTERLOCKING IS PROVIDED ON INCOMING SUPPLIES TO SWITCHBOARDS NSB01 TO NSB04 SUCH THAT IT IS NOT POSSIBLE TO HAVE THE BUS COUPLER AND BOTH INCOMING MCCBs CLOSED
  - 9.00 SUB DISTRIBUTION UNIT NSB406 CONSISTS OF WALL MOUNTED MCCB ENCLOSURE COMPLETE WITH METERING
  - 11.0 RAILHOUSE CONSUMER'S ISOLATOR IN FORM OF 2 WALL MOUNTED ENCLOSURES EACH HOUSING 400A MCCB WITH NEUTRAL LINK AND ADJUSTABLE THERMAL AND ADJUSTABLE MAGNETIC TRIP SETTINGS AS XS400CJ
- LEGEND**
- DISTRIBUTION BOARD WITH INTEGRAL ISOLATOR
  - LOCAL METERING UNIT COMPLETE WITH PULSE OUTPUT
  - WITHDRAWABLE PATTERN AIR CIRCUIT BREAKER WITH MANUAL SPRING CHARGE
  - TPN CONFIGURATION
  - 630A FRAME SIZE
  - 400A SETTING
  - MV101 MV CABLE REFERENCE
  - P207 LV CABLE REFERENCE
  - CASTELL KEY LOCK (N DENOTES KEY NUMBER)

**RECORD DRAWING**

|         |     |     |         |
|---------|-----|-----|---------|
| JAN '03 | TJW | ANT | JAN '03 |
|---------|-----|-----|---------|

NSB1102 ADDED & MCCB'S FOR SURGE PROTECTION NSB1202 NOW ON P1203

|    |     |     |         |
|----|-----|-----|---------|
| AS | DRS | ANT | NOV '02 |
|----|-----|-----|---------|

REVISED WHERE INDICATED

|    |     |     |          |
|----|-----|-----|----------|
| AF | DRS | ANT | JULY '02 |
|----|-----|-----|----------|

REVISED WHERE INDICATED

|    |     |     |           |
|----|-----|-----|-----------|
| AE | DRS | ANT | APRIL '02 |
|----|-----|-----|-----------|

CIS UPS ADDED, EL22 EMERGENCY LITG INVERTER MOVED TO NSB01/2. MINOR REVISIONS WHERE INDICATED

|    |     |     |         |
|----|-----|-----|---------|
| AD | DRS | ANT | JAN '02 |
|----|-----|-----|---------|

MINOR REVISIONS TO BOARD FAULT LEVELS, 21/22 CHILLER NOW ON 400A WAY. RAILHOUSE FEEDERS REVISED, MCC4 INCREASED TO 250A TRIP UNIT

|    |     |     |         |
|----|-----|-----|---------|
| AC | DRS | ANT | OCT '01 |
|----|-----|-----|---------|

AMENDED WHERE INDICATED

|    |     |     |          |
|----|-----|-----|----------|
| AB | DRS | ANT | JUNE '01 |
|----|-----|-----|----------|

AMENDED WHERE INDICATED ISSUED FOR CONSTRUCTION

|   |     |     |         |
|---|-----|-----|---------|
| A | DRS | ANT | MAY '01 |
|---|-----|-----|---------|

EXTENSIVELY REVISED DUE TO DELETION OF EAST END PACKAGE SUBSTATION RENAMED NSB01

|    |     |     |         |
|----|-----|-----|---------|
| P2 | SLB | ANT | MAR '01 |
|----|-----|-----|---------|

PRELIMINARY ISSUE

|    |    |     |         |
|----|----|-----|---------|
| P1 | BS | ANT | JAN '01 |
|----|----|-----|---------|

ISSUED FOR RECORD

**RAILTRACK Project Delivery**  
North West  
4th Floor, 111 Piccadilly  
Ducie Street  
Manchester  
M1 2HY

Tel: 0161 228 8191  
Fax: 0161 228 8099

**LAINC**  
Lainc Limited  
Connaught House, 1 Brinsley Road, Old Trafford,  
Manchester, M16 5SR Tel: 0161 872 2273

**STATUS**  
**RECORD DRAWING**

**CLIENT** MAJOR STATIONS  
**PROJECT** PICCADILLY ONLINE  
**STATION** PICCADILLY STATION MR08350  
**TITLE**

SINGLE LINE DIAGRAM  
PACKAGE SUBSTATION NSB01

**SCALE** N.T.S. **@ AD** **DATE** JAN '01  
**DRAWN BY** D SMITH **CHECKED BY** P McDONNELL **APPROVED BY** A N TURNER

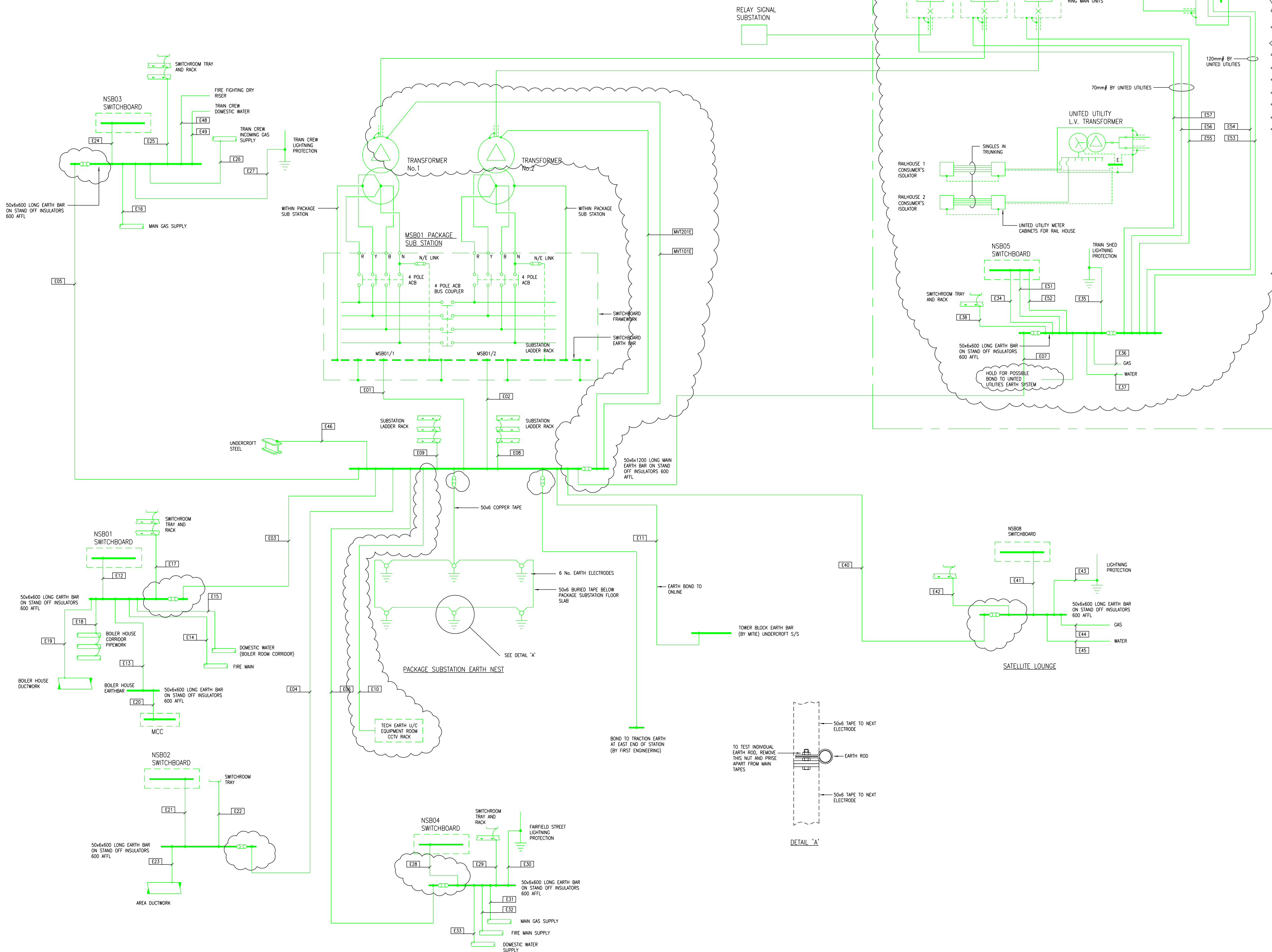
|             |      |             |    |          |      |            |      |          |        |
|-------------|------|-------------|----|----------|------|------------|------|----------|--------|
| PROJECT No. | 5702 | DRAWING No. | 00 | C/SW No. | (61) | ISSUED No. | E031 | REVISION | JAN 03 |
|-------------|------|-------------|----|----------|------|------------|------|----------|--------|

|                                                            |
|------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b> |
| <b>Manchester Piccadilly Short Stay Car Park Form A</b>    |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

## APPENDIX F – ELECTRICAL SERVICES MAIN EARTHING SCHEMATIC

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- 1.0 THIS DRAWING SHOWS TYPICAL EARTH BONDING CABLEING ONLY. FOR CIRCUIT PROTECTIVE CONDUCTORS SEE CABLE SCHEDULES E011-E013
- 2.0 FOR CABLES SHOWN ON THIS DRAWING SEE CABLE SCHEDULE E014

|                                            |     |      |          |     |
|--------------------------------------------|-----|------|----------|-----|
| RECORD DRAWING                             |     |      |          |     |
|                                            | DRS | ANT  | SEPT '02 |     |
| REVISED WHERE INDICATED                    |     |      |          |     |
| AB                                         | DRS | ANT  | OCT '02  |     |
| CONSTRUCTION ISSUE REVISED WHERE INDICATED |     |      |          |     |
| AA                                         | DRS | PMcD |          | ANT |
| PRELIMINARY ISSUE                          |     |      |          |     |
| P1                                         | DRS | PMcD |          | ANT |

RECORD DRAWING

ELECTRICAL SERVICES  
MAIN EARTHING SCHEMATIC

|                                                            |
|------------------------------------------------------------|
| <b>C0033 – Network Rail EV Charging Point Installation</b> |
| <b>Manchester Piccadilly Short Stay Car Park Form A</b>    |

| Document Reference Number |                 |               |               |                   |         |
|---------------------------|-----------------|---------------|---------------|-------------------|---------|
| Project Code              | Originator Code | Document Code | Document Type | Sequential Number | Version |
| 172768                    | KCL             | FOA           | EDS           | 000036            | A02     |

## APPENDIX G – DRN COMMENTS

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|                                                                                                        |                                     |                              |                   |                   |                |            |
|--------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------|-------------------|-------------------|----------------|------------|
| <br><b>Page 1 of 5</b> | <b>Document Review Notice (DRN)</b> |                              |                   |                   | <b>DRN No:</b> |            |
|                                                                                                        | <b>Form Ref</b>                     | <b>NR/L2/RSE/02009/F0044</b> | <b>Issue Date</b> | <b>06/03/2021</b> | <b>Issue</b>   | <b>9.0</b> |

|                                       |             |                              |                                            |  |  |
|---------------------------------------|-------------|------------------------------|--------------------------------------------|--|--|
| <b>Project Number:</b>                | 172768      | <b>Project Name:</b>         | Phase 2 – EV Chargers Installation Project |  |  |
| <b>Project Manager:</b>               | James Kelly | <b>Principal Contractor:</b> | Kier                                       |  |  |
| <b>Engineering Deliverable Owner:</b> | Kier        | <b>CEM Name:</b>             | Prem Hari                                  |  |  |
| <b>Submission Discipline:</b>         | M&E         | <b>CRE Name:</b>             | Naeem Riaz                                 |  |  |

|                                                                                                                          |                                           |            |                                                                                           |                                          |            |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------|-------------------------------------------------------------------------------------------|------------------------------------------|------------|
| <b>Document / Deliverable Number:</b><br>(Or attach schedule of deliverables for submission where agreed with unique ID) | <b>Document No</b>                        | <b>Rev</b> | <b>Title</b>                                                                              | <b>Revision No:</b><br>(Or see schedule) | <b>A01</b> |
|                                                                                                                          | <a href="#">172768-KCL-DRG-EDS-000138</a> | A01        | PROPOSED EV CHARGING INFRASTRUCTURE MANCHESTER PICCADILLY CAR PARK GENERAL ARRANGEMENT    |                                          |            |
|                                                                                                                          | <a href="#">172768-KCL-DRG-EDS-000139</a> | A01        | MANCHESTER PICCADILLY - EV CHARGING INFRASTRUCTURE PROPOSED - SINGLE LINE DIAGRAM         |                                          |            |
|                                                                                                                          | <a href="#">172768-KCL-DRG-EDS-000140</a> | A01        | MANCHESTER PICCADILLY CAR PARK EV CHARGING INFRASTRUCTURE PROPOSED EARTHING BLOCK DIAGRAM |                                          |            |
|                                                                                                                          | <a href="#">172768-KCL-FOA-EDS-000036</a> | A01        | Manchester Piccadilly - Short Stay Car Park - EV Charging - Form A                        |                                          |            |
|                                                                                                                          | <a href="#">172768-KCL-REG-EDS-000013</a> | A01        | Manchester Piccadilly - Short Stay Car Park - EV Charging - Assumptions Register          |                                          |            |
|                                                                                                                          | <a href="#">172768-KCL-RSA-EDS-000014</a> | A01        | MANCHESTER PICCADILLY - EV CHARGING INFRASTRUCTURE - Designers Risk Assessment            |                                          |            |

|                                                  |                                                                                                      |                          |        |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------|--------|
| <b>Document / Deliverable Title or Schedule:</b> | 172768 - Issuing Grip 4 Design Package (A01) Post IDC for NWR review/approval -Manchester Piccadilly | <b>Project Phase:</b>    | Grip 4 |
| <b>DPE Name: Usman Khan</b>                      |                                                                                                      | CSM Significant: (Y / N) | No     |

|                                            |                |                           |                             |
|--------------------------------------------|----------------|---------------------------|-----------------------------|
| <b>Document Transmittal/Submission No:</b> |                |                           |                             |
| Date Received:                             | 07/05/2022     | Date Return Required:     | 20/05/2022                  |
| <b>REVIEWERS: -</b>                        | <b>DRN No:</b> | 172768-BUS-DRN-EDS-000005 | <b>DRN Date:</b> 27/05/2022 |
| Name                                       | Position       | Discipline                | Signature                   |
| Usman Khan                                 | DPE            | (Lead) - DPE              | UK                          |
| Katie Forbes                               | PE             | PE                        | KF                          |
| Janusz Wojcicki                            | PE             | PE                        | JW                          |
| Peter Gee                                  | AE             | Asset Engineer            | PG                          |

|                                                   |                 |                        |
|---------------------------------------------------|-----------------|------------------------|
| <b>DISTRIBUTION LIST (of completed review): -</b> |                 |                        |
| <b>Name</b>                                       | <b>Position</b> | <b>Action Required</b> |
| Naeem Riaz                                        | CRE             |                        |
| Prem Hari                                         | CEM             |                        |

|                                                                                                        |                                     |                              |                   |                   |                |            |
|--------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------|-------------------|-------------------|----------------|------------|
| <br><b>Page 2 of 5</b> | <b>Document Review Notice (DRN)</b> |                              |                   |                   | <b>DRN No:</b> |            |
|                                                                                                        | <b>Form Ref</b>                     | <b>NR/L2/RSE/02009/F0044</b> | <b>Issue Date</b> | <b>06/03/2021</b> | <b>Issue</b>   | <b>9.0</b> |

|                                                |  |                                     |                                             |                                                 |                                       |
|------------------------------------------------|--|-------------------------------------|---------------------------------------------|-------------------------------------------------|---------------------------------------|
| <b>Document / Deliverable/Schedule Format:</b> |  | <b>PDF</b> <input type="checkbox"/> | <b>Source Data</b> <input type="checkbox"/> | <b>Two Dimensional</b> <input type="checkbox"/> | <b>Model</b> <input type="checkbox"/> |
|------------------------------------------------|--|-------------------------------------|---------------------------------------------|-------------------------------------------------|---------------------------------------|

|                             |                                              |                 |                                               |                                          |
|-----------------------------|----------------------------------------------|-----------------|-----------------------------------------------|------------------------------------------|
| <b>DOCUMENT REVIEW: -</b>   |                                              |                 | <b>Review Level:</b><br>Basic/Detailed/Exempt |                                          |
| <b>Overall DRN Category</b> | <b>Rejected</b><br>Non-compliant to contract | <b>Accepted</b> | <b>Accepted</b><br>with Amendments            | <b>Not Accepted</b><br>Revise & Resubmit |
| <b>2</b>                    | <b>0</b>                                     | <b>1</b>        | <b>2</b>                                      | <b>3</b>                                 |

Acceptance of these documents/deliverables by Network Rail is not be deemed as validation of the submission, nor does it infer fitness for purpose. Network Rail does not accept any liability for the submission.

Any changes to the documents should be undertaken in accordance with change control procedures adopted by individual contracting organisations. Such variations are required to be formally recorded and evidence should accompany any resubmission.

Without relieving the originating organisation of their contractual responsibilities my categorisation and comments are as follows:

- Overall DRN Category 0 rejected and a category 3 non acceptance requires the whole document/deliverables(s) to be revised and resubmitted to address the comments. Prior to any re-work a way forward shall be agreed between supplier and the Designated Project Engineer
- Overall DRN Category 2 acceptance with amendments requires the appropriate responses with additional information to be submitted to address the comments
- Comment type 0 is used to capture comments if the submission is an overall DRN Category 0
- Comment types 2A, 2B, 3A and 3B require a written response & Comment type 4 is for information only

For comments types 2 or 3 a suffix is added to the comment type: **A)** Quality of Supplier's submission or **B)** Client preference/changes.

|                     |                 |                   |    |              |            |
|---------------------|-----------------|-------------------|----|--------------|------------|
| <b>**Issued By:</b> | Janusz Wojcicki | <b>Signature:</b> | JW | <b>Date:</b> | 27/05/2022 |
|---------------------|-----------------|-------------------|----|--------------|------------|

|                                                                            |            |                   |    |              |            |
|----------------------------------------------------------------------------|------------|-------------------|----|--------------|------------|
| <b>DRN ACCEPTANCE AND/OR CLOSED OUT</b> (including Supplier's responses):- |            |                   |    |              |            |
| <b>**Closed By:</b>                                                        | Usman Khan | <b>Signature:</b> | UK | <b>Date:</b> | 15/06/2022 |

**\*\*** Only to be signed by the Project Designated Project Engineer or person with such formally recorded delegated authority. Review comments to be returned to Supplier via control process agreed between the Project Manager and Supplier.

|                                                                                                 |                              |                       |  |                                   |            |       |     |
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| <br>Page 3 of 5 | Document Review Notice (DRN) |                       |  | DRN No: 172768-BUS-DRN-EDS-000005 |            |       |     |
|                                                                                                 | Form Reference               | NR/L2/RSE/02009/F0044 |  | Issue Date                        | 06/03/2021 | Issue | 9.0 |

| Network Rail (NR) |                                                                                                                                                                                                       |    |      |                                    | Supplier                       |                                                                                                                                                                                                                                                                                                                                                                                                |    | NR                              | * |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------|---|
| No                | Comments                                                                                                                                                                                              | By | Type | Integration Activity<br>(Yes / No) | Comment Accepted<br>(Yes / No) | Responses                                                                                                                                                                                                                                                                                                                                                                                      | By | Response Accepted<br>(Yes / No) |   |
| 01                | Comments: <i><b>"Once all cables have been drawn into ducts, all holes shall be sealed by a waterproof sealing compound to prevent the ingress of water, vermin"</b></i> to be added to the drawings. | JW | 2A   |                                    |                                | Noted, drawing notes to be updated.                                                                                                                                                                                                                                                                                                                                                            |    | Yes                             |   |
|                   | <b>172768-KCL-FOA-EDS-000028.2</b>                                                                                                                                                                    |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                                                                                                                |    |                                 |   |
| 02                | Point 7.2.2 (page19), the proposed feeder pillar should have a sloping roof to prevent littering                                                                                                      | JW | 2A   |                                    |                                | Please note that the reference doc (Ref: 172768-KCL-FOA-EDS-000028.2) is incorrect as this is the Signed A1 for Manchester.<br><br>The designer assumes this comment refers to Form A document (Ref: 172768-KCL-FOA-EDS-000036), and confirms this note will be updated in the Form A.                                                                                                         |    | Yes                             |   |
|                   | <b>172768-KCL-DRG-EDS-000139</b>                                                                                                                                                                      |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                                                                                                                |    |                                 |   |
| 03                | Power supply for the proposed equipment of the feeder pillar (light, socket, etc.) not included in the schematic.                                                                                     | JW | 2A   |                                    |                                | All feeder pillar details to be shown at GRIP 5 detailed design stage.                                                                                                                                                                                                                                                                                                                         |    | Yes                             |   |
|                   | <b>172768-KCL-DRG-EDS-000132</b>                                                                                                                                                                      |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                                                                                                                |    |                                 |   |
| 04                | Bay 1,2 and 3,4, please confirm there is sufficient space for the customer to leave charger area when cars are in the bays.                                                                           | JW | 2A   |                                    |                                | Egress from existing bays have a pinch point by the support columns. It is assumed that since these are existing bays and in use, that they are functional and users are able to egress bays at present therefore would also be able to egress from charger point area. If a clear walking route to EVC points is required then a number of existing parking bays would have to be removed and |    | Yes                             |   |

|                                                                                                 |                              |                       |  |                                   |            |       |     |
|-------------------------------------------------------------------------------------------------|------------------------------|-----------------------|--|-----------------------------------|------------|-------|-----|
| <br>Page 4 of 5 | Document Review Notice (DRN) |                       |  | DRN No: 172768-BUS-DRN-EDS-000005 |            |       |     |
|                                                                                                 | Form Reference               | NR/L2/RSE/02009/F0044 |  | Issue Date                        | 06/03/2021 | Issue | 9.0 |

| Network Rail (NR) |                                                                                                                                                                                                                |    |      |                                    | Supplier                       |                                                                                                                                                                                                                                                                                                      |    | NR                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------|
| No                | Comments                                                                                                                                                                                                       | By | Type | Integration Activity<br>(Yes / No) | Comment Accepted<br>(Yes / No) | Responses                                                                                                                                                                                                                                                                                            | By | Response Accepted<br>(Yes / No) |
|                   |                                                                                                                                                                                                                |    |      |                                    |                                | stakeholder agreement would be required and should be considered at Grip 5.                                                                                                                                                                                                                          |    |                                 |
|                   | 172768-KCL-DRG-EDS-000138                                                                                                                                                                                      |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                      |    |                                 |
| 05                | All Cable Support Systems for the EV Charging Installation should be Proposed New, Independent and Separate from Any Existing Cable Support System presently existing on site.                                 | PG | 2A   |                                    |                                | The designer agrees with this statement, however, as directed by NR project team, the assumption is to follow the same route and where possible utilised existing containment within the LV room only. This will be detailed at GRIP 5 with full cable management system calculation being required. |    | Yes                             |
| 06                | What mitigation measures will be in place when routing the 2No 150mm DIA Cable Ducts, underground, from where they enter the Covered Pedestrian Walkway / Pavement and Roadway, as these will still be in use? | PG | 2A   |                                    |                                | The designer respectively defers this comment to the civils DRN where this comment will be addressed accordingly.                                                                                                                                                                                    |    | Yes                             |
|                   |                                                                                                                                                                                                                |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                      |    |                                 |
|                   |                                                                                                                                                                                                                |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                      |    |                                 |
|                   |                                                                                                                                                                                                                |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                      |    |                                 |
|                   |                                                                                                                                                                                                                |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                      |    |                                 |
|                   |                                                                                                                                                                                                                |    |      |                                    |                                |                                                                                                                                                                                                                                                                                                      |    |                                 |

\*

END

|                                                                                                 |                              |                       |  |                                   |            |       |     |
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|                                                                                                 | Form Reference               | NR/L2/RSE/02009/F0044 |  | Issue Date                        | 06/03/2021 | Issue | 9.0 |

| Network Rail (NR) |          |    |      |                                    | Supplier                       |           |    | NR                              |
|-------------------|----------|----|------|------------------------------------|--------------------------------|-----------|----|---------------------------------|
| No                | Comments | By | Type | Integration Activity<br>(Yes / No) | Comment Accepted<br>(Yes / No) | Responses | By | Response Accepted<br>(Yes / No) |

\*

**From:** Peter Gee  
**Sent:** 19 May 2022 16:37  
**To:** Yaxye Ali; Usha Mepani; Katie Forbes; Janusz Wojcicki; Usman Khan; Steve Duffy; Alex Lewis; Deon Robinson; Terry Bleasdale; Christopher White; Sam Puddephatt; Emma Lawler; Michael Gradwell; Harry Chester  
**Cc:** James Kelly; Nicholas Turner; Michael Cheadle; James Woof; Andrew Ledger; David Sides  
**Subject:** RE: Manchester Piccadilly Short Stay Car Park - IDC/IDR Grip 4 - Central route

OFFICIAL

Hi Yaxye,  
My Comments are as follows:-

- 1) Why are we utilising Existing Cable Ladder and Cable Tray Systems, Etc for part of the Sub Mains Install? - **All Cable Support Systems for the EV Charging Installation should be Proposed New, Independent and Separate from Any Existing Cable Support System presently existing on site.**
- 2) What mitigation measures will be in place when routing the 2No 150mm DIA Cable Ducts, underground, from where they enter the Covered Pedestrian Walkway / Pavement and Roadway, as these will still be in use?
- 3) Feeder Pillar.
  - We need to ensure this will not require Listed Buildings Consent.
  - We need to ensure that this does not unduly affect persons when they are using this area.
  - Ideally a Composite / GRP Feeder Pillar would be preferential for Corrosion Resistance, BUT, it must be highly vandal resistant, due to the Environment in which you are proposing it to be installed (We already have problems with persons urinating on the doorway of the Existing Switchroom).
    - Lighting and Self-Test Emergency Lighting will be required Internally.
    - Suitable ventilation will be required (Natural or Forced).
    - Anti-Condensation Heater/s / Frost Protection Heater/s will be required, together with the appropriate Frost Protection Thermostat and Command and Control Installation.
    - A 2Gang 13Amp RCD Protected Socket Outlet will be required.
    - Appropriate Laminated Distribution Circuit Charts / Drawings shall be provided within a suitable holder.
    - Circuit Charts shall be provided within the inside of the Distribution Board Door.
    - The Self Adhesive Circuit Designation Strips the Distribution Board shall be labelled, NOT hand written.
    - Externally the Distribution Board shall be labelled accordingly (With its designation, Etc) utilising Engraved Traffolyte or Ivorine Labels, Securely Affixed to the outer door/s of the Distribution Board – Not just self-adhesive.
    - External to the Feeder Pillar Enclosure, suitably sized Engraved Traffolyte or Ivorine Labels shall be securely affixed to the GRP Enclosure/s, indicating the Designation, Etc of the Equipment Installed within it. – Warning Labels will also be required.
    - **Irrespective of all the above all Labelling shall be provided in strict accordance with BS7671.**

Once all other interested parties have completed and signed the Form A, I will sign for the Network Rail Route Asset Manager (or their representative) as “Asset Engineer (Building Services)”.

I trust this is of some assistance.

Many Thanks,  
Regards,

Peter Gee.

**Peter Gee. - I.Eng. ACIBSE | Asset Management Buildings LNW | Asset Engineer (Building Services)**

**Network Rail | Square One** | 4 Travis Street | Manchester | M1 2NY

Mobile: +44 (0) 7701052334

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[www.networkrail.co.uk](http://www.networkrail.co.uk)

**Notice of Future Annual Leave:-**

- 1) Wednesday 27<sup>th</sup> April 2022.
- 2) 6<sup>th</sup> May to 13<sup>th</sup> May 2022 (Inclusive dates).
- 3) 27<sup>th</sup> June to 1<sup>st</sup> July 2022 (Inclusive dates).

