TRANSPORT for LONDON

Power Upgrade Project (PUP) - Feasibility and Early Contractor Involvement

VOLUME 1 – Contract Data

Project Reference Number: tfl_scp_002389

Call-Off Contract under the TfL PSFW2 - 94203

SCHEDULE 7A

(Form of Agreement - Long Form Call-Off Contract)

FORM OF AGREEMENT

Call-Off Contract Number:

Lot: A2: Multi-Disciplinary Rail Services

Outline Agreement: PUP Feasibility Study

THIS AGREEMENT is made the **15th** day **of October 2024**

BETWEEN:

(1) **Transport for London** whose registered office is at 5 Endeavour Square, London, E20 1 JN ("the *Employer"* which expression shall include its successors in title and assigns); and

(2) **Mott MacDonald Limited** whose registered office is at 10 Fleet Place, London EC4M 7RB ("the *Consultant*").

WHEREAS:

(A) This Agreement is made pursuant to a framework agreement between the Parties relating to the provision of TfL PSF2 94203 – Engineering Consultancy Services dated 13 July 2021 ("the Framework Agreement").

(B) The *Employer* wishes to have provided ("the *services*") as contained in the Scope (tfl_scp_002389_vol_2_Scope dated 12/06/2024)

(C) The *Employer* has accepted a tender by the *Consultant* for the design of the *services* and correction of Defects therein in accordance with the *conditions of contract* (in the form of the Long Form as set out in Schedule 2A of the Framework).

NOW IT IS AGREED THAT:

1. Terms and expressions defined in (or definitions referred to in) the *conditions of contract* have the same meanings herein.
2. The *Consultant* Provides the Services in accordance with the *conditions of contract*.
3. The *Employer* pays the *Consultant* the amount due in accordance with the *conditions of contract*.
4. The documents forming the contract are:

4.1 this Form of Agreement duly executed by the Parties;

4.2 the *conditions of contract;*

4.3 the attached Call-Off Contract Data Part 1;

4.4 the attached Call-Off Contract Data Part 2; and

4.5 the following documents:

- the Scope (tfl_scp_002389_vol_2_Scope dated 12/06/2024)
- Schedules 1, 2A, 7A, 7C inclusive of the Framework Agreement;
- Mott MacDonald's Fixed Price Surveys Activity Schedule (ref Fixed Price Surveys – Activity Schedule dated 2/10/2024) (Appendix 1)
- TfL's Clarifications during tender response period (ref PUP Feasibility – Clarifications dated 17/09/2024)
- Mott MacDonald's post-tender clarifications and assumptions (ref PUP Assumptions Mott MacDonald – Answers 12-08-2024 (Closed out) dated 09/09/2024)
- Mott MacDonald's Technical Proposal 19/07/2024 - Methodology
- Mott MacDonald's Technical Proposal 19/07/2024 - Risk Register
- Mott MacDonald's Technical Proposal 19/07/2024 - Health & Safety

5. Where there is any discrepancy or conflict within or between the documents forming the contract the order of priority shall be as follows:

5.1.1	First	:	This Form of Agreement;
5.1.2	Second	:	The *conditions of contract*;
5.1.3	Third	:	The Scope and any other documents included in this contract

6. Notwithstanding the manner of execution of this Agreement it is agreed that:

6.1 the limitation period within which any claim may be brought by the *Employer* for breach of this Agreement by the *Consultant* is 12 years from the date of breach; and

6.2 the *Consultant* agrees not to raise in defence of any such claim a shorter limitation period whether pursuant to the Limitation Act 1980 (as the same may be amended or re-enacted from time to time) or otherwise.

IN WITNESS whereof this Agreement has been signed for and on behalf of the *Employer* and the *Consultant* the day and year written above.

Signed by)
for and on behalf of)
The *Employer*)

DocuSigned by: [redacted]

Victoria Carpenter

Commercial Manager, TfL

Signature Print name and position

Date: 16/10/2024 | 13:50 BST

Signed by)
for and on behalf of)
The *Consultant*)

Signed by: [redacted]

Suzanne Mathieson

Principal Account Lead (RTA)

Signature Print name and position

Date: 15/10/2024 | 20:33 BST

CALL OFF CONTRACT DATA

Part One - Data provided by the *Employer*

Statements given in all contracts

1 General

- The *conditions of contract* are the core clauses as may be amended or supplemented by the clauses for Main Option E with fixed price for surveys and Secondary Options X2. X10, X11, each as may be amended or supplemented by [the LUL Requirements] all as attached to the Transport for London Professional Services Framework Agreement.
- The *Employer* is

  Name: Transport for London
  Address: Transport for London, 5 Endeavour Square, London, E20 1JN

- The *Employer's Agent* is (are) DieuMerci Munganga and Daniel Prego

  Address: Transport for London, 5 Endeavour Square, London, E20 1JN

- The authority of the *Employer's Agent* is as set out in Option X10.
- The *services* are Feasibility and Early Contractor involvement. The key scope activities for this package include:
  - Developing options for the upgrade of existing substations and traction power cable sections;
  - Carrying out desktop and on-site surveys, including, at a high level: on site comparisons with existing data of substations, condition assessments and ground investigation;
  - Establishing the assessment criteria to enable options to be considered;
  - Contractor involvement in the consideration of constructability and logistics, followed by the production of an updated project cost estimate for the SPO;
  - Consideration of environmental / sustainability issues and opportunities.

- The Scope is in Volume 2 - Scope and Appendices which comprises of the following documents:

  PUP Feasibility Technical Requirements Specification_V2.2
  Appendix A - MDL
  Appendix B - Power Modelling Report – 36 Tram Fleet
  Appendix C - Power Modelling Report – 40 Tram Fleet
  Appendix D - Existing Tram Records
  Appendix E - Exchange Information Requirements
  Appendix F - Environmental Evaluation
  Appendix G - To be provided upon contract award
  Appendix H - Renewal Project Work bank
  Appendix I - PCIP
  Appendix K - TfL Estimating Template
  Appendix L – Architectural Design Description (ADD)
  Appendix M - Power Calculation Summary

- The *language of this contract* is **English**
- The *law of the contract* is **the law of England and Wales**
- The *period for reply* is 2 **weeks** for general communications**.**

  TRRSP-PUP-1836 *period for reply*:

  All MDL deliverable submissions
  - *Employer's* Initial Review – 15 working days
  - *Employer's* re-work review – 10 working days

  Risk assessment method statement (RAMS) / work request forms (WRF)
  - *Employer's* Initial Review – 25 working days
  - *Employer's* re-work review – 10 working days

- The *period for retention* is **12 years following Completion or earlier termination**.
- The Adjudicator nominating body is **the Institution of Civil Engineers (ICE).**
- The *tribunal* is **the courts of England and Wales**
- The following matters will be included in the Risk Register

. . . . . .
. . . . . .

2 The Parties' main responsibilities

- The *Employer* provides access to the following persons, places and things

access to	*access date*
. . . Refer to Contract Data Part 2.	. . . . . .tbc . . . . .
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	. . . . .
. . . . .	
. . . . .	

3 Time

- The *starting date* is ***11 October 2024***.
- The *Consultant* submits revised programmes at intervals no longer than **4 weeks.**

4 Quality

- The quality policy statement and quality plan are provided within **4 weeks** of the Contract Date
- The *defects date* is **12 weeks** after Completion of the whole of the *services*.

5 Payment

- The *assessment interval* is **4 weeks**
- The *currency of this contract* is **pounds Sterling (£)**
- The *interest rate* is 2.5 **% per annum above the base rate of the Bank of England**.

8 Indemnity, insurance and liability

- The amounts of insurance and the periods for which the *Consultant* maintains insurance are

Event	**cover**	**Period following Completion of the whole of the *services* or earlier termination**

Liability of the *Consultant* for claims made against him arising out of his failure to use the degree of reasonable skill, care and diligence normally used by competent professionals experienced in providing services similar to the *services* in connection with works of a similar size, scope and complexity to the Works (professional indemnity insurance)	**£ 2,000,000 (two million pounds)** for each and every claim and in the aggregate per annum	. . . . .
Liability for death of or bodily injury to a person (not an employee of the *Consultant*) or loss of or damage to property resulting from an action or failure to take action by the *Consultant*	**£10,000,000 (ten million pounds) in respect of each** claim, without limit to the number of claims	. . . . .
Liability for death of or bodily injury to employees of the *Consultant* arising out of and in the course of their employment in connection with this contract.	**£5,000,000 (five million pounds) or as stated below** in respect of each claim, without limit to the number of claims	. . . . .

- The *Consultant's* total liability to the *Employer* for all matters arising under or in connection with this contract, other than the excluded matters, is £5,000,000.00 (£5 million).

Optional statements

- The *completion date* for the whole of the *services* is 27 June 2025
- The *key dates* and *conditions* to be met are

condition to be met	*key date*
1 IDC/IDR Meeting	10-Mar-25
2 MML Issue Single Preferred Option	16-May-25
3 MML Issue Final Feasibility Report	13-Jun-25

Completion of the stated *condition* for the *key date* is defined as all deliverables issued, reviewed and accepted by the *Employer*.

- The *Consultant* is to submit a first programme for acceptance within **2 weeks** of the Contract Date.
- The *Consultant* prepares forecasts of the total Time Charge and at intervals no longer than **4 weeks**.
- [redacted]
- [redacted]

If Option X2 is used

- The *law of the project* is the law of England and Wales.

If Option X10 is used

- The Employer's Agents is (are) DieuMerci Munganga and Daniel Prego

CALL OFF CONTRACT DATA PART TWO

Data provided by the *Consultant*

Completion of the data in full, according to the Options chosen, is essential to create a complete contract.

Statements given in all contracts

- The *Consultant* is
  Name Mott MacDonald Limited
  Address 10 Fleet Place, London EC4M 7RB, United Kingdom

- The *key persons* are

(1) Name Sebastien Lechelle
Job Project Director
[redacted]

(2) Name James Arbuckle
Job: Engineering Manager & CEM
[redacted]

(3) Name Helena Abbey
Job: Project Manager
[redacted]

- The *staff rates* are

Framework Grade	**Name / designation**	[redacted]
Director	Joseph Cosgrave / EMC - Lead	[redacted]
Director	Ian Yoxall / Principal Contractor & Surveys Management	[redacted]
Junior Consultant	TBC / Traction Power - CAD	[redacted]
Senior Consultant	Helena Abbey / Project Manager	[redacted]
Director	Mark Bailey / BIM Lead	[redacted]
Senior Consultant	Kazeem Adedoyin / Traction Power - Engineer	[redacted]
Consultant	Lucas Golding-Yee / Assistant Project Manager	[redacted]
Consultant	Hamish Robertson / Traction Power - Engineer	[redacted]
Consultant	Arsalan Hafeez / Systems Assurance - Engineer	[redacted]
Consultant	Grace Cox / Environmental & Sustainability - Consultant	[redacted]
Principal Consultant	Aleksandar denkov / Traction Power - Engineer	[redacted]
Director	Ilya Karichev / Systems Assurance - Lead	[redacted]

Senior Consultant	Katie Dixon / Environmental & Sustainability - Lead	[redacted]
Consultant	Steven Bridge / LV Power - Engineer	[redacted]
Principal Consultant	Sandeep Patel / Civils - Lead	[redacted]
Senior Consultant	Anna Tyler / Civils - Engineer	[redacted]
Junior Consultant	Ella Harriott / Cost Estimating - Estimator	[redacted]
Consultant	Oluwaseun Ajayi / Structures - Engineer	[redacted]
Principal Consultant	Luke Olsen / Cost Estimating - Lead	[redacted]
Director	Lloyd Edmonds / Principal Designer	[redacted]
Junior Consultant	Suhaib Khalid / Systems Assurance - Engineer	[redacted]
Director	Steve Cooper / Principal Contractor & Surveys Management	[redacted]
Director	Pawel Dudek / LV Power - Lead	[redacted]
Director	Philip Hallgarth / Structures - Lead	[redacted]
Consultant	Nathan Jones / Environmental & Sustainability - Consultant	[redacted]
Director	KC Tan / Telecoms/ SCADA - Lead	[redacted]
Senior Consultant	Alex Smith / Telecoms - Engineer	[redacted]
Principal Consultant	Adam Hodges / Structures - Engineer	[redacted]
Senior Consultant	Bethany Gray / Environmental & Sustainability - Consultant	[redacted]
Director	Elizabeth Allen / Planner - Lead	[redacted]
Director	Robert Pudney / Fire Engineering - Lead	[redacted]
Director	Andrew Thompson / OCS - Lead	[redacted]
Senior Consultant	Alice Pike / Fire Engineering - Engineer	[redacted]
Director	Tim Hartley / Systems Assurance - Approver	[redacted]
Principal Consultant	Lauren Bradshaw / Environmental & Sustainability - Consultant	[redacted]
Director	Sebastien Lechelle / Project Director	[redacted]
Director	Stuart Stallwood / Cost Estimating - Approver	[redacted]
Senior Consultant	Jake Cullen / Cost Estimating - Estimator	[redacted]
Junior Consultant	TBC / Telecoms - CAD	[redacted]
Principal Consultant	Michelle Webb / Geotechnical - Lead	[redacted]
Director	Lei Zhang / Structures - Approver	[redacted]
Junior Consultant	TBC / Traction Power - CAD	[redacted]
Director	Rebecca Purslow / Environmental & Sustainability - Consultant - Approver	[redacted]
Director	Claire Squires / Environmental & Sustainability - Consultant - Approver	[redacted]
Director	Tim Granger / LV Power - Approval	[redacted]

Director	Ian MacKenzie / Civils - Approver	[redacted]
Director	James Arbuckle / Engineering Manager & CEM	[redacted]
Director	Mehmet Tutucu / Traction Power - Lead	[redacted]
Consultant	Yunus Lekmiti / Fire Engineering - Engineer	[redacted]

- The following matters will be included in the Risk Register
  Risk register included in 4.5.

Optional statements

- The *Consultant* is to submit a baseline programme for acceptance within **2 weeks** of contract execution.

- The *Employer* provides access to the following persons, places and things

Access to	**Access date**
The eight substations: • Belgrave Walk • Dundonald Road • Mitcham Junction • Beckenham Junction • Therapia Lane • Addington Village • Oaks Road • East Croydon	2025 Q1-Q2
Areas of track containing parallel feeders	2025 Q1-Q2
Control room / SCADA equipment room	2025 Q1-Q2
Therapia Lane Depot	2025 Q1-Q2
Mandatory Site Training	2025 Q1-Q2
Additional sites TBC	2025 Q1-Q2
Provision of maintenance staff to accompany Mott MacDonald during surveys to lift lids, open cabinets, etc.	2025 Q1-Q2

Transport for London

Programme	Trams Replacement Rolling Stock (TRRS)
Project	Power Upgrade Project (PUP)
Reference	LR07.006-TfL-POW-REQ-RQ-00162

Technical Requirements Specification

Feasibility and Early Contractor Involvement

	Endorsement statement	Signature
Prepared by	Mohammed Hamzah Baporia Requirements Engineer	MohammedBaporia Digitally signed by MohammedBaporia Date: 2024.06.10 16:22:17 +01'00'
Reviewed by	Ioannis Karakitsos Discipline Engineer	IoannisKarakitsos Digitally signed by IoannisKarakitsos Date: 2024.06.10 16:19:26 +01'00'
Reviewed by	I confirm that I have reviewed this document with other relevant project Discipline Engineers and that their technical comments have been taken into consideration. I endorse it on behalf of the LT Head of Engineering. Louis Wohlgemuth Lead Engineer	LouisWohlgemuth Digitally signed by LouisWohlgemuth Date: 2024.06.10 16:08:27 +01'00'
Reviewed by	Dieu-Merci Munganga Assistant Project Manager (PUP)	DieuMerciMunganga Digitally signed by DieuMerci Munganga Date: 2024.06.10 16:31:41 +01'00'
Reviewed by	Gareth Reid Senior Estimator	GarethReid Digitally signed by GarethReid Date: 2024.06.10 16:48:00 +01'00'
Endorsed by	Josh Ramsey Project Manager (TRRS)	[redacted] Digitally signed by JoshuaRamsey Date: 2024.06.10 16:56:15 +01'00'
Endorsed by	Darren Singh Infrastructure Manager	DarrenSingh Digitally signed by DarrenSingh Date: 2024.06.11 10:55:00 +01'00'
Approved by	I confirm that this deliverable meets the requirements of the relevant IPPM Product Description and that all consultation comments have been addressed to the satisfaction of consultees. Jonathan Small TRRSP Programme Manager	Jonathan Small Digitally signed by Jonathan Small Date: 2024.06.11 11:27:48 +01'00'

Distributed to

Esther Olorunfemi	Head of Engineering, LT
Alexandru Giubega	HV Power Asset Engineer
Will Utley	Fleet Project Engineer
Dylan Brooks-Jones	Civils Project Engineer
James Batchelor	Systems Project Engineer
Melville Rodrigues	EMC Project Engineer
Peter Goldring	M&E Project Engineer,
Jignesh Patel	Project Systems Engineer
Nicola Perrins	System Safety Project Engineer
Fionnuala O'Curry	Human Factors Project Engineer
Jon Colclough	SHE Environment Manager
Victoria Carpenter	Commercial Manager
Jon Dersley	Planning Manager
Jennifer Oxley	SHE Business Partner
Omar Ahmed	LT Access Manager
Zanjabil Qureshi	Requirements Engineer

Document History

Revision	Date	Summary of changes
1.0	06/07/2023	First draft
1.1	03/08/2023	Updated following review from TRRS PM and Power PE
1.2	14/09/2023	Updated with final stakeholder comments
1.3	05/10/2023	Updated following commercial discussions
2.1	21/05/2024	Update to requirements and technical scope for retender. Update in response to market engagement (Technical Queries & Assumptions) a summary of updates include: - Surveys added - Project Risks outlined - Technical requirements to include additional information either in the requirement text itself or in the supporting information in order to provide the relevant technical guidance. - Refinement of requirement text(s) to make clear the expectations for optioneering and the Single Preferred Option (SPO)
2.2	10/06/2024	Requirements consolidated in the form of a single requirements table and final review complete.

Table of Contents

Abbreviations

The following abbreviations are used in this document:

Abbreviations	Definition
AC	Alternating Current
BIM	Building Information Modelling
BREEAM	Building Research Establishment Environmental Assessment Method
CAD	Computer Aided Design
CCTV	Closed Circuit Television
CDM	Construction Design and Management Regulations
CEEP	Carbon and Energy Efficiency Plan
CEM	Contractor's Engineering Manager
CRE	Contractor's Responsible Engineer
CSM RA	Common Safety Method for Risk Evaluation & Assessment
DAOL	Direct Acting Over Load
DC	Direct Current
DfT	Department for Transport
DNO	Distribution Network Operator
DRA	Designer's Risk Assessment
ECI	Early Contractor Involvement
EE	Environmental Evaluation
E&M	Electrical and Mechanical
EFC	Estimated Final Cost
EIR	Exchange Information Requirements

Abbreviations	Definition
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference
ESF	Electrical Switching Form
GiGL	Greenspace Information for Greater London
HV	High Voltage
ITT	Invitation to Tender
LT	London Trams
LV	Low Voltage
MDL	Master Deliverables List
MIDP	Master Information Delivery Plan
MTS	Mayor's Transport Strategy
NCR	Non-Compliance Report
OLE	Overhead Line Equipment
PDF	Portable Document Format
PIX	Project Information Exchange
PUP	Power Upgrade Project
RAM	Reliability Availability Maintainability
RAMS	Risk Assessment & Method Statement
RMU	Ring Main Unit
ROGS	The Railway & Other Guided Transport Systems (Safety) Requlations
ROM	Rough Order of Magnitude

Abbreviations	Definition
SCADA	Supervisory Control And Data Acquisition
SEMP	Systems Engineering Management Plan
SPO	Single Preferred Option
SuDS	Sustainable Drainage Systems
TfL	Transport for London
TMS	Tram Management System
TRS	Technical Requirements Specification
TRU	Transformer Rectifer Unit
VE	Value Engineering
V&V	Verification & Validation

Definitions

The following terms are used in this document:

Term	Definition
Cable (Cabling)	One or more insulated conductors surrounded by a further insulating layer and in some cases a further protective layer or layers, which may themselves be conductive.
Consultant	Refers to the supplier party that will be awarded the tender.
Contractor	Refers to the third party appointed by the Consultant, subject to approval by TfL London Trams.
Depot	The location at which the Trams are maintained by the Maintainer.
Design Life	Revenue earning service life of the Tram.
Employer	TfL London Trams
Existing Fleet of Trams	The current fleet comprising of Bombardier CR4000 Flexity Swift trams and of Stadler Variobahn Trams.
EU Regulation No. 402	Commission Regulation 402/2013 (the Common safety method for risk evaluation and assessment) established a common safety method for risk evaluation and assessment (CSM REA).
London Trams Network	The tram network in the south of London on which the Trams operate.
Substation or Traction substation	The tram substation which contains electrical equipment in order to convert the local power supply into the voltage required to operate the tram network.
Substation extension	Option that entails extending existing substation or installing new module in close proximity to existing to cater for installation of new traction power equipment.
Topographic survey	Also known as a land, terrain (or topo survey), is a type of survey that maps the boundaries, features and levels of a site.
Traction Current Section	A section of track that has traction current supplied from one or more substations.
Traction Power Cable or Traction feeder cable	A power cable forming any part of the DC traction power supply circuit originating within a substation and ending with connection to the overhead line wire, or as a connector between two lengths of overhead line wire.

Term	Definition
Transformer Rectifier Unit	A Transformer Rectifier Unit (TRU) includes an 11 kV or 6.6 kV to LV (294 V) traction transformer and a rectifier that converts the 294 V AC to 750 V DC to supply traction power to trams .

1 Introduction

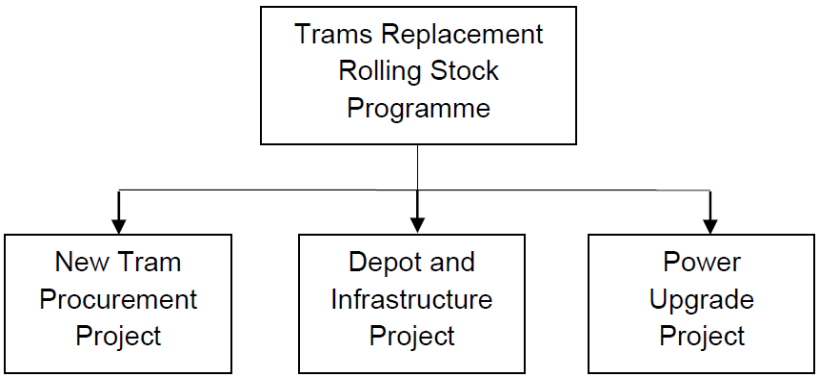
This document defines the Trams Replacement Rolling Stock (TRRS)- Power Upgrade Project (PUP) requirements (both functional and non-functional) for the feasibility work and Early Contractor Involvement (ECI) study required to be undertaken by the Consultant.

1.1 Project Background

London Trams has two tram fleets – 24 Bombardier CR4000s and 12 Stadler Variobahns. The CR4000 fleet was manufactured in 1998-99, entered passenger service in May 2000 and is now close to the end of its design life. The frequency and severity of CR4000 failures is increasing and without intervention, it's expected that the tram service will continue to deteriorate.

To address this issue the London Trams Network is due to be upgraded with the introduction of new rolling stock. It is intended that the 24 existing Bombardier CR4000 trams will be withdrawn after fleet migration is complete. It is proposed that the 12 existing Stadler trams are retained, and 24 new trams introduced. There is a further option for TfL to consider increasing the overall tram fleet size to 40 vehicles, which would enable an increase in the service frequency on the New Addington branch.

This forms the background to the TRRS programme. Within this programme, there are three projects:



The PUP will deliver the upgrade to TfL-owned traction power infrastructure. The upgrades will involve interfaces with other engineering systems / assets, including track, civils and communications disciplines. The substations are in urban areas, which will require consideration for positioning of any new assets and construction arrangements.

1.2 Works Completed to Date

Using knowledge of the existing tram fleets, as well as data gleaned from a market study to create a “representative new tram”, TfL has undertaken in-house power modelling in 2023 to identify any constraints on the current traction power supply network. This has identified a number of substations and cabling resilience works that need to be addressed (Appendix B and C).

1.3 Substations

The are currently 13 traction substations which are providing 750 V Direct Current (DC) to the Overhead Line Equipment (OLE), these substations are as follows:

1. Jubilee Bridge (JUB)
2. Sandilands (SAN)
3. East Croydon (ECR)
4. Therapia Lane (TPL)
5. Love Lane (LVL)
6. Belgrave Walk (BGW)
7. Mitcham Junction (MTJ)
8. Oaks Road (OAK)
9. Woodside (WDS)
10. Dundonald Road (DDR)
11. Addington Village (ADV)
12. Parkway (PKW)
13. Beckenham Junction (BEC)

For the traction sections and their abbreviations please refer to the London Tramlink drawing (see Section 9, Supporting Diagrams, Figure 2).

2 Scope

The Employer (TfL, London Trams) requires the Consultant to consider infrastructure upgrades to the following substations, as part of the feasibility study.

2.1 Substation Upgrades

Development of substation 1-4 below, was part of the initial modelling output, which covered the upgrade expected to support operation of up to 24 new trams. Subsequently, this was extended to location 5 for 36 new trams and locations 6 to 8, for operation of up to 40 new trams.

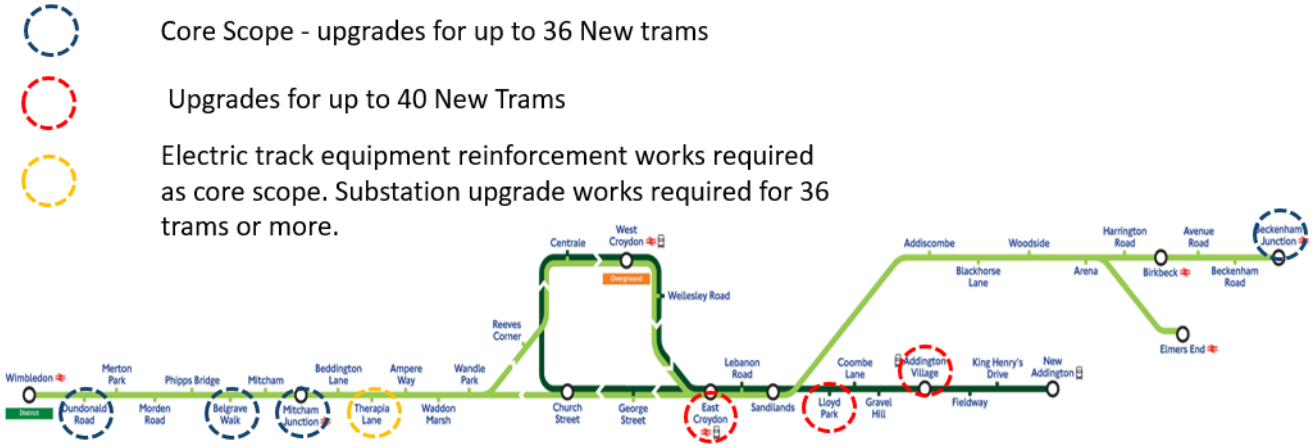


Figure 1: Location of the substations identified for infrastructure upgrades

- Upgrades are required at the substations:
    i. 1-4 below, for a 24 trams scenario or
    ii. 1-5 below, for a 36 new trams scenario:
        1. Belgrave Walk
        2. Dundonald Road
        3. Mitcham Junction
        4. Beckenham Junction
        5. Therapia Lane
- Upgrades at the substations 6-8 below, are only required for a 40 trams scenario:
        6. Addington Village
        7. Oaks Road
        8. East Croydon

Note: it is important to highlight that there are trackside cable reinforcement works needed for all scenarios (i.e. >=24 new trams). These are detailed in section 2.2. below.

2.2 Electrical Section Upgrades

In addition to the substation upgrades, the following electrical sections will need re-enforcement with parallel positive cables to maintain line voltages at an acceptable level under outage conditions:

2.2.1 Cable Reinforcements

Table 1: Positive Parallel Cable Reinforcements for 24 New Trams (for up to a total fleet of 36 Trams).

Sections	Electrical Section	Minimum Length of 240 mm² Cu cable (m)
Elmer's End branch, single track section to South-West of loop	WL Woodside to Love Lane	384 (whole of single line section)
South-East from Oaks Road substation	OA Oaks Rd to Addington Village	1500
South-East from Addington Village substation	AP Addington Village to Parkway	500

The following sections have been identified close to low line voltage limits, and marginally under limits for up to 36 *new* trams, if the scenario of Distribution Network Operator (DNO) undervoltage is considered.

For sections in Table 2, below, options of installation of positive parallel cable reinforcements or other alternatives (such as increase of transformer rectifier tap settings) will be proposed.

Table 2: Additional sections for positive parallel cable reinforcements or other mitigation

Section	Electrical Section ID	Length
Harrington Road – Arena	WL	1.15 km
Waddon Marsh – Wandle Park	JT	509 m
Wandle Park – Reeves Corner	JT	660 m
Reeves Corner – Centrale	EJ	300 m

Centrale – West Croydon	EJ	285 m
West Croydon - Wellesley Road	EJ	626 m
Church Street – Wandle Park	EJ, JT	841 m
Wandle Park – Waddon Marsh	JT	509 m
Waddon_Marsh - Ampere_Way	JT	720 m

See requirements detailed in the TRS, 5.3 Electrical Sections, in relation to Table 1 and 2, above.

2.3 Power Capacity Modelling

Power modelling (see appendices B and C) has identified substation capacity issues and made high-level proposals for capacity increase to meet the increased loading.

A summary in tables 3 and 4 below is the high-level objective for substation capacity increase (please note the order of numbering does not indicate preference).

Table 3: Summary of substation capacity increase requirement as a result of up to 36 New Trams (Source: SPG-VCP-RPT-TRL-001)

Substation	Capacity Increase Option 1	Capacity Increase Option 2
Dundonald Road	Install additional 1 x 0.6 MW TRU	
Belgrave Walk & Mitcham Junction	Install additional 1 x 0.6 MW TRU at Belgrave Walk No works at Mitcham Junction	Replace existing 1 x 0.6 MW TRU with 1 x 1.2 MW TRU at Belgrave Walk Replace existing 1 x 0.6 MW TRU with 1 x 1.2 MW TRU at Mitcham Junction
Beckenham Junction	Install additional 1 x 0.6 MW TRU	
Therapia Lane substation (36 trams)	See section 2.4 below	

Table 4: Summary of additional substation capacity increase requirements as a result of 40 New Trams (Source: SPG-VCP-RPT-TRL-002)

Substation	Capacity Increase Option 1	Capacity Increase Option 2
East Croydon	Install additional 1 x 1 MW TRU	
Oaks Road & Addington Village	Install additional 1 x 0.6 MW TRU at Oaks Road Install additional 1 x 0.6 MW TRU at Addington Village	Replace existing 1 x 0.6 MW TRU with 1 x 1.2 MW TRU at Oaks Road Replace existing 1 x 0.6 MW TRU with 1 x 1.2 MW TRU at Addington Village

For all sites detailed in Tables 3 (except for Therapia Lane) & 4 the following options as a minimum shall be assessed for each site individually based on requirements detailed in the TRS, Optioneering Approach section.

- Provision of an extension module near the existing substation, that will house as a minimum new TRU, DC switchgear, 11 kV RMU (or 6.6 kV for East Croydon) and all other SCADA, control, LV and ancillary equipment. Connection to existing 750 V DC system either via modification of existing DC switchgear or modification/addition of substation trackside isolator switches.
- Within existing substation, replacement of existing TRU with modern equivalent TRU of increased capacity, at the same footprint of existing TRU (due to space constraints in existing substation). Upgrade any other equipment (e.g. DC switchgear, cables, etc) within existing substation as required in order to accommodate uplift in rating and fault levels.
- Other alternative options if available.

It is likely that value engineering and efficiencies could be identified through variations of the above options and different suboptions.

2.4 Therapia Lane Substation Upgrades

For Therapia Lane substation the main upgrades required are summarised below:

- Building of new substation module to contain a minimum of 2 x 0.6 MW TRU units (or other suitable rating) that will feed the depot stabling yard (excluding tram maintenance shed) and will provide N-1 resilience. DC switchgear, 11 kV RMU and all other SCADA, control, LV and ancillary equipment to be included in the new module.

- Upgrade of 12 DC DW positive 630 sqmm Cu cable (530 m from substation + 40 m from CABINET DLW 12-20 to DLW X15-X20) and upgrade of 12 DCF DE positive track feeder 630 sqmm Cu cable (350 m from substation + 35 m from DLE 16-20 to DLE x16-x20). New cable routes might be needed between substation and stabling yard, and will need to take account of any changes to the depot stabling yard layout that may occur as part of the over-arching Trams Replacement Rolling Stock Programme.
- Further upgrades of Isolator switches and cables in the depot stabling yard as detailed in document Power Calculation Summary (LR07.001-TfL-POW-RPT-TC-00106 2.0) for Scenario B. This includes upgrades of positive cable from substation 12 DCF DS to the maintenance shed, shed negative return cable and shed positive cable between shed OLE switches.
- Review of depot sectionalisation for end state loading and optioneering for resectionalisation in order to minimise depot yard upgrades required.

See requirements detailed in the Substations and Therapia Lane depot section.

3 System Architecture

3.1 Traction Power System

The Trams traction power system is a typical single pole DC traction overhead catenary system with floating traction return. Please refer to the Architectural Design Description (Appendix L) for detailed description.

4 Project/External Interfaces

There are a number of renewal projects that are scheduled to be undertaken during the development and delivery of the PUP, which are outlined in the Renewal Project Workbank (Appendix H). This includes a live renewals project to replace the existing DC switchgear that is scheduled to commence implementation in 2024 with one substation being done each year in the following order:

1. Belgrave Walk;
2. East Croydon;
3. Jubilee Bridge;
4. Sandilands;
5. Love Lane;
6. Woodside;

7. Mitcham Junction;
8. Dundonald Road;
9. Parkway;
10. Beckenham Junction.

The programmes for these renewal projects are all subject to change.

Stakeholder Engagement will be managed by the Employer. Should there be a need to engage with a stakeholder, the Consultant shall notify the Employer who shall facilitate this. It is anticipated that engagement will be required (but not limited to) TfL, Tram Operations Limited (TOL) and the London Fire Brigade (LFB).

5 Assumptions, Dependencies and Risks

5.1 Assumptions

The list below details the assumed factors that could affect the requirements:

1. The options identified in the power modelling studies are the only viable options to resolve the resilience issues.
2. When there is a substation outage, the substation is operated in bypass mode as opposed to being single end fed, as per advice received from the LT HV asset team.
3. The variables selected for the ‘representative future tram’ are reflective of conservative power parameters and power draw.

5.2 Dependencies

The list below details the known dependencies on the project:

1. Planning permission, if required for the substation upgrades, will be obtained within 6 months of application and prior to a detailed design and build tender being sought.
2. Any land purchase, temporary access agreements or wider consents required are secured in advance of any construction commencing on site.
3. The full implementation of PUP is dependent on sufficient funding being secured to cover the Estimated Final Cost (EFC).
4. The identified power upgrades are required to enable the new tram fleet to be introduced without causing resilience issues it is anticipated that some of the identified PUP scope will need to be prioritised to prevent significant resilience issues later in the new fleet’s migration period.

5. Access to the traction power infrastructure and planning of any upgrades will need to be undertaken with consideration of LT Network Rules (see appendix J) and the progress of other LT renewal projects.

6. TfL will need to confirm whether a fleet of 24, 36 or 40 trams is to be introduced as this will directly impact the extent of power upgrades required.

7. The Employer will manage load applications associated with requesting increased HV capacity from the DNO.

5.3 Risks

The Employer with the input from Consultant will coordinate the SCADA modifications required for new substations or plant with the wider upgrades of the Tram Management System (TMS).

The list below details the potential risks to the project:

1. TfL land ownership may be limited to be able to accommodate new power infrastructure.

2. Existing cable routes may have insufficient spare capacity to accommodate additional cabling, necessitating new cable management systems to be provided.

3. Existing power assets or interfacing systems may not be compatible with the new power upgrades proposed, requiring decisions to be made on the provision for any additional scope in PUP or re-prioritising of other renewal projects' scopes.

4. Power upgrade locations may have restricted access due to proximity of residential housing or limitations of access roads or space for work compounds. The final design of power upgrades shall not unnecessarily impact ancillary site use purposes, such as parking for LT Infrastructure Maintenance vehicles.

5. It is noted that a renewals project in the Therapia Lane Depot to remove the gas fired boilers is ongoing. As a result the capacity of the existing AC Transformer and supply cables may be altered before end March 2025.

6 Deliverables

The primary aim of this commission is to develop the PUP to inform the concept design, through the selection of a single preferred option (SPO) at the identified traction power infrastructure locations. A summary of the key activities include:

- Developing options for the upgrade of existing substations and traction power cable sections

- Reviewing existing information (Appendix D) to determine the scope of surveys required and carrying them out, to inform the optioneering
- Establishing the assessment criteria, for employer review (to enable options to be considered).
- Contractor involvement in the consideration of constructability and logistics for each option, followed by the production of an updated project cost estimate for the SPO.
- Consideration of environmental / sustainability issues and opportunities in line with the TfL Corporate Environmental Plan

The conclusion of the feasibility stage will require the Consultant to facilitate and provide the material for multiple workshops with the Employer and external stakeholders for the discrete elements of feasibility work to be considered, to enable confirmation of the SPO.

Following the conclusion of this feasibility work, ECI should be undertaken to provide a comprehensive assessment of the affordability and deliverability of the SPO.

It is envisaged that the commission will be undertaken in the following sequence of stages:

- Stage 1 – Consultant to gather all relevant background information, reviewing earlier reports and drawings. The Consultant shall develop a number of initial options for each of the discrete items outlined in the Design requirements (Requirements section 4) and other sections of the TRS.
- Stage 2 – From an initial assessment of options, the Consultant shall refine the number of options through a series of workshops, surveys, Rough Order of Magnitude (ROM) constructability and feasiblity work to enable a single preferred option (SPO) to be selected and subsequently refined.
- Stage 3 – Following the confirmation of the SPO, the Consultant will engage with a Contractor to develop detailed constructability, carry out value engineering to improve the affordability of the project, and finalise the cost estimate. The estimate produced as part of the feasibility stage will reflect the development undertaken during the commission.

The Master Deliverables List (MDL) can be found in Appendix A. This shall form part of the basis of the Consultant's scope of works, in addition to the requirements.

The Consultant will utilise the information supplied in the Pre-Construction Information Pack (PCIP) (Appendix I), to carry out the design development work and associated surveys.

7 Requirements Structure

All requirements are provided in tabular form (export from DOORS) within the Technical Requirement Specification (Section 10) of this document. The following information has been provided for each attribute:

- **ID:** a unique identifier and is alpha-numeric, starting with the prefix ‘TRRSP-PUP-‘ followed by a number. This unique identifier is generated by DOORS and stays with the requirement throughout its lifecycle to delivery and acceptance. Unique identifiers must be used in all future communications regarding the requirements.
- **Requirement Text:** a detailed description of what the requirement entails.
- **Supporting Information**: This provides further information that may help Consultants and (third-party) Contractors when formulating their responses to each requirement within the TRS when applicable.
- **Rationale**: This explains the reasoning or benefit that each requirement has, when applicable.

8 Legislation & LT, British, Euro, ISO and Industry Standards

The Consultant shall ensure that the requirements of all applicable British or European Standards, European and UK Legislation and Law (in each case as amended or replaced from time to time) shall be met in design, construction, delivery, testing and commissioning, maintenance, operation and disposal of any new or altered assets. A non-exhaustive list of the Standards follows below.

Organisation	Number	Title
N/A		Electromagnetic Compatibility Regulations 2016
Statutory Instruments		
SI	L153	The Construction (Design and Management) regulations 2015
SI	2009 No. 3242	The Management of Health and safety at Work regulations 2009
SI	1989 No. 635	The Electricity at Work Regulations 1989
SI	2010 c. 15	The Equality Act 2010
SI	1998 No. 2306	The Provision and Use of Workplace Equipment Regulations 1998
SI	2008 No. 1597	The Supply of Machinery (Safety) Regulations 2008
SI	2005 No. 1541	The Regulatory Reform (Fire safety) Order 2005
UK Public General Acts		
	2021 c. 24	Fire Safety Act 2021
London Trams (LT) standards		
	LT-IMS-ENG-050	Standard for Asset Classification
	LT-IMS-ENG-060	Standard for Location Code System
	LT-IMS-ENG-070	Computer Aided Design
	LT-IMS-ENG-106	Assurance of New and Altered Assets
	LT-IMS-ENG-107	Master Document List
	LT-IMS-ENG-165	Standard for Engineering Change Control
	LT-IMS-ENG-169	Standard for Engineering Standards
	LT-IMS-ENG-170	Standard for Design Management
	LT-IMS-ENG-465	Standard for Depot Systems
	LT-IMS-ENG-663	Standard for Low Voltage and Lighting Systems
	LT-IMS-ENG-666	Standard for Fire Detection, Suppression Systems and Compartmentation - Requirements
	LT-IMS-ENG-760	Standard for LV Traction and Substations
	LT-IMS-ENG-761	Standard for Substation Inspection and Maintenance
	LT-IMS-ENG-762	Standard for Earthing Bonding and Cabling
	LT-IMS-ENG-764	Standard for OLE Performance, Alignment and Configuration
	LT-IMS-ENG-765	Standard for Substation Earthing
	LT-IMS-ENG-815	Procedure for Managing Electromagnetic Compatibility (EMC)
	LT-IMS-ENG-863	Standard for Tram-Power Interface Management
	LT-IMS-ENG-865	Standard for Electromagnetic Capability (EMC)
	LT-IMS-ENG-961	Standard for Lineside Environment
	LT-IMS-ENG-962	Standard for Drainage
	LT-IMS-ENG-963	Standard for Civil Structures

Organisation	Number	Title
	LT-IMS-ENG-964	Standard for Buildings, Premises and Tram Stops
General BS and BS EN		
BS	7671: 2018	IET Requirements for electrical Installations 18th Edition (in effect from January 2019)
BS	5266-1: 2016	Code of practice for the emergency lighting of premises
BS	7430: 2011+A1:2015	Code of practice for protective earthing of electrical installations
BS	60529: 1992+A2:2013	Degrees of protection provided by enclosures (IP code) inc. Amd 2- 2011
BS	50123-1:2003	Railway applications. Fixed installations. D.C. switchgear. General View details
BS EN	50633:2016	Railway applications — Fixed installations — Protection principles for AC and DC electric traction systems
BS	61869-6:2016	Instrument transformers. Additional general requirements for low-power instrument transformers
BS	7211: 2012+A1:2020	Electric cables. Thermosetting insulated and thermoplastic sheathed cables for voltages up to and including 450/750 V for electric power and lighting and having low emission of smoke and corrosive gases when affected by fire
BS	7919:2001	Electric cables. Flexible cables rated up to 450/750V, for use with appliances and equipment intended for industrial and similar environments
BS	6724:2016	Electric cables. Thermosetting insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V, having low emission of smoke and corrosive gases when affected by fire
BS	5839–1: 2017	Fire detection and fire alarm systems for buildings. Code of practice for design, installation, commissioning and maintenance of systems in non-domestic premises.
BS	8519:2020	Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications
BS	5467:2016	Electric cables. Thermosetting insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V
BS ISO	BS ISO 55001:2014	Asset management. Management systems. Requirements
BS EN	50162:2004	Protection against corrosion by stray currents from DC
BS EN ISO	14713-1:2017	Zinc coatings. Guidelines and recommendations for the protection against corrosion of iron and steel in structures. General principles of design and corrosion resistance
BS	4343: 1992	Plugs, socket-outlets and couplers for industrial purposes. Dimensional interchangeability requirements for pin and contact-tube accessories.
BS EN IEC	60309 – 2:2022	
BS EN	60898-1:2019	Electrical accessories ± Circuit breakers for overcurrent protection for household and similar installations. Circuit-breakers for a.c. operation
BS EN	61008-1: 2012+A12:2017	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). General rules
BS EN	61009:2012+A13:2021	Residual current operated circuit-breakers with integral

Organisation	Number	Title
		overcurrent protection for household and similar uses (RCBOs). General rules
BS EN	60934:2001+A2:2013	Circuit-breakers for equipment (CBE)
BS EN	50126-1: 2017	Railway Applications. The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS). Generic RAMS Process
BS EN	50126-2:2017	Railway Applications. The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS). Systems Approach to Safety
BS EN	60300-3- 4:2022	Dependability management. Application guide. Guide to the specification of dependability requirements
BS EN	50121-1-x (2017) series	Railway applications. Electromagnetic compatibility. General
BS EN	50122-1:2022	Railway applications. Fixed installations. Electrical safety, earthing and the return circuit. Protective provisions against electric shock
BS EN	50122-2:2022	Railway applications. Fixed installations. Electrical safety, earthing and the return circuit. Provisions against the effects of stray currents caused by DC traction systems
BS EN	61000-1 (Series)	Electromagnetic compatibility (EMC). General sets of products based EMC standards.
BS EN	61386-1: 2008+A1:2019	Conduit systems for cable management. General requirements
BS EN	50085-1: 2005+A1:2013	Cable Trunking systems and cable ducting systems for electrical installations. General requirements
Network Rail		
NR	NR/SP/ELP/27224	Specification for Installation of Cable Routes Forming Part of the Traction Distribution System
Chartered Institute of Building Services Engineers		
CIBSE	Guide E	Fire Engineering
CIBSE	Guide F	Energy Efficiency
CIBSE	Guide G	Public Health Engineering
CIBSE	Guide H	Building Control Systems
CIBSE	Guide K	Electricity in Buildings
CIBSE	Guide L	Sustainability
CIBSE	Guide M	Maintenance Engineering and Management
British Standards Fire		
LFEPA	No 29	Fire Safety Guidance
Published Documents		
PD	7974-0	Guide to design framework and fire safety engineering principles
PD	7974-5	Fire service intervention
PD	7974-6	Evacuation
PD	7974-7	Probabilistic risk assessment
Publicly Available Specification		
PAS	79	Fire Risk Assessment. Guidance and a recommended methodology

9 Supporting Diagrams

10 Technical Requirement Specification

The following table is an export from the DOORS module.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-261	**1 Deliverables**		
TRRSP-PUP-2026	The Consultant shall complete all requirements within this TRS.		
TRRSP-PUP-2051	The Consultant shall complete the deliverables listed in the Master Deliverables List appended to this scope document.	Any deviations from the deliverables listed in the MDL shall be agreed with the Employer in writing.	
TRRSP-PUP-264	**2 Management Requirements**		
TRRSP-PUP-265	**2.1 Meetings and Reporting**		
TRRSP-PUP-1825	The Consultant shall allow for an hour progress / commercial meeting every two weeks via teleconference / Microsoft Teams.	As soon as possible after the Contract Start Date, the Employer will convene a start-up meeting with the Consultant. The meeting will be used to confirm systems for the control, administration, reporting and management of the Project, and to confirm lines of communication, information flows, change control and procedures. Meetings will normally be held at the offices of the Employer or via Microsoft Teams.	To ensure communication and stakeholder engagement that will inform design.
TRRSP-PUP-1826	The Consultant shall attend via Microsoft Teams and prepare all necessary material for the following: One hour Start-up meeting; Fortnightly one hour project management / engineering meeting; Periodic one and half hour designer's risk, assumptions and design change review; Periodic one hour requirements development, management and V&V review; Periodic one hour hazard identification workshop and log review; Periodic one hour commercial review meeting; At least 2x two hour cost estimate workshops throughout the duration of the contract; At least 2x two hour construction methodology workshops throughout the duration of the contract;	N/A	To ensure communication and stakeholder engagement that will inform design. To facilitate production of deliverables and reviews.
TRRSP-PUP-1827	The Consultant is required to submit a periodic progress report, including an update of the Consultants forecast spend profile, to the Employer by close of play on the final Friday of each period.	N/A	Project management

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1828	The Consultant shall agree with the Employer the content of the periodic progress report before the submission of the first report.	N/A	Project management
TRRSP-PUP-1829	The Consultant shall provide all necessary personnel for the review meetings, which should as a minimum include the project manager and the commercial manager.	N/A	To ensure communication and stakeholder engagement that will inform design. To facilitate production of deliverables and reviews.
TRRSP-PUP-1830	Where meetings are held to discuss technical issues, engineers from the appropriate discipline shall be present from the Consultant's side.	N/A	To ensure communication and stakeholder engagement that will inform design. To facilitate production of deliverables and reviews.
TRRSP-PUP-303	**2.2 Project Interfaces**		
TRRSP-PUP-1831	The Consultant shall review the register of current and proposed Trams power renewal projects that are being delivered through to 2030 (Appendix H) and advise of any potential conflicts / interfaces that would need to be considered. Any impacts on the deliverability and programme for PUP shall be highlighted to the Employer to consider.	Stakeholder Engagement will be managed by the Employer. Should there be a need to engage with a stakeholder, the Consultant shall notify the Employer who shall facilitate this. It is anticipated that engagement will be required (but not limited to) TfL, Tram Operations Limited (TOL) and the London Fire Brigade (LFB).	There are a number of renewal projects that are scheduled to be undertaken during the development and delivery of the PUP, which are outlined in Appendix H. This includes a live renewals project to replace the existing DC switchgear that is scheduled to commence implementation in 2024 with one substation being done each year in the following order: 1. Belgrave Walk; 2; East Croydon; 3.Jubilee Bridge; 4. Sandilands; 5. Love Lane; 6. Woodside; 7. Mitcham Junction; 8. Dundonald Road; 9. Parkway; 10. Beckenham Junction. The programmes for these renewal projects are all subject to change.
TRRSP-PUP-317	**2.3 Appointments**		
TRRSP-PUP-1832	The Consultant shall submit for approval all key engineering discipline personnel / Project Manager and any subsequent changes in personnel.	It is required that all (Design and Construction) appointments will have the required competencies to fulfil the required roles, with necessary experience of working on TfL / Network Rail power / multi-disciplinary design and installation projects	Quality assurance
TRRSP-PUP-1833	The Consultant shall appoint personnel to fulfil the roles of relevant technical disciplines and perform the duties associated with being a Principal Designer and Principal Contractor under CDM.	All appointments shall have the appropriate level of certification and will normally be Chartered Engineers (or working towards) with demonstrable competency and relevant experience.	CDM and Safety
TRRSP-PUP-335	**2.4 Document Control and Contract Management**		

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1834	The Consultant shall adopt the information management and document control procedures set out in exchange information requirements (EIR) for the following document categories: Management plans; Engineering deliverables e.g. Design documentation; Nominations for CRE/CEM; Reports.	The exchange information requirements (EIR) in Appendix E shall be utilised as the basis for the commission.	Compliance with information management practices.
TRRSP-PUP-1835	Asite shall be the system utilised for contract management. This includes the submission and approval of Applications for Payment, submission of Request For Information (Technical Queries), Consultants Programme, Early Warnings and Compensation Events. The Consultant will be provided with access to Asite.		Document control practices
TRRSP-PUP-2030	ASite training is required for Consultant staff.	One session for contract management and one for document reviews. 1hr per online session.	
TRRSP-PUP-353	**2.5 Document Review**		
TRRSP-PUP-1836	The Consultant shall allow for approval durations within their programme as stated below and in the contract data: • All MDL deliverable submissions ¬ Employer's Initial Review – 15 working days ¬ Employer's re-work review – 10 working days • Risk assessment method statement (RAMS) / work request forms (WRF) ¬ Employer's Initial Review – 25 working days ¬ Employer's re-work review – 10 working days	Where the Consultant's documents require Employer acceptance, the number of iterations required to achieve acceptance shall will be at the risk of the Consultant and the Consultant shall will be deemed to have made due allowance in its price and programme for complying with this. The periods of reply required by this contract are set out in the contract data. The periods of reply stated do not guarantee that the deliverable will be accepted within that timescale should the deliverable not be at an acceptable standard, once the timescale has elapsed.	To allow more accurate planning.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1837	The Consultant shall adhere to the following commenting system during the design review process through Asite: CAT 1 Comment for information only – no response from consultant required. CAT 2A Accepted with amendments due to a Consultant submission quality issue – response from consultant required. This requires the appropriate responses with additional information, document changes and resubmission to be shared for TfL acceptance to address the comments. CAT 2B Accepted with amendments that are a Employer preference – response from consultant required. This requires the appropriate responses with additional information and document resubmission to be shared for TfL acceptance to address the comments. CAT 3 Rejected – document to be revised and resubmitted following update. Prior to any re-work, a way forward shall be agreed between consultant and TfL.	N/A	To facilitate design reviews and approvals.
TRRSP-PUP-371	**2.6 Planning Requirements**		
TRRSP-PUP-1838	The Consultant shall submit a fully logic linked programme for acceptance within the period stated in the Contract Data. The first accepted programme shall form the basis of future reporting.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically
TRRSP-PUP-1839	The Consultant shall submit a draft programme with 3 weeks actual and 1 week estimate on Friday week 3 of each period.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically
TRRSP-PUP-1840	The programme shall be submitted to the Project Manager electronically in P6 (XER) and PDF, using a layout format to be agreed before submission.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically
TRRSP-PUP-1841	The programme percent complete type shall be set to physical. The method of measurement of physical percent complete shall be proposed to the Project Manager at the start-meeting for acceptance.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically
TRRSP-PUP-1842	The programme shall clearly identify any obligations of the Employer.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically
TRRSP-PUP-1843	The programme WBS should be agreed with the PM and its settings and population of codes shall be subjected to the Project Manager's validation process before acceptance into the Project Manager's database.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	Validation by the PM ensures accuracy and consistency in coding and classification

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1844	The programme shall include all key milestones and Contract dates for the design, including all dates scheduled in Contract Data Pt 1.	See MDL-002- A programme shall be provided to cover the works being undertaken during the commission. To be updated periodically	Including dates from Contract Data Pt 1 ensures compliance with contractual obligations and project timelines, reducing the risk of delays and disputes.
TRRSP-PUP-1845	The programme shall include all deliverables as per the MDL, including any management plans, works package or others required to complete the works.	see MDL.	Including all MDL deliverables ensures comprehensive coverage of project requirements
TRRSP-PUP-2032	**2.7 Appointment of Subcontractor**		
TRRSP-PUP-2033	The appointment of any subcontractor shall be done on an open book basis.		Ensuring transparency in subcontractor appointments.
TRRSP-PUP-2034	Prior to any third party procurement activity commencing, the Consultant shall inform the Project Manager of the exact scope and extent of the sub-contract.		To ensure alignment with project objectives and maintain oversight.
TRRSP-PUP-2036	The Consultant shall make available to the Project Manager a copy of the enquiry documentation for review 10 working days prior to inviting competitive tenders.		This allows the Project Manager sufficient time to review the enquiry documentation.
TRRSP-PUP-2037	A minimum of three competent sub-Contractors shall be invited to tender for any works the consultant cannot resource internally.		Ensures a competitive bidding process.
TRRSP-PUP-2053	The Consultant shall procure sub-contracts for works and services on the basis of best value for money considering competitive bidding, basis of remuneration (lump sum, re measurement or cost reimbursement), market availability, schedule and pricing trends, custom and usage of trade, together with knowledge of the past performance of selected tenderers.		To ensure the project secures the most economical and efficient execution.
TRRSP-PUP-2054	Where competitive tendering or lump sum remuneration is not intended to be applied by the Consultant then the Consultant shall provide the Project Manager full justification of the proposed alternative contracting strategy and approach together with the methodology to be employed to secure value for money.		To maintain transparency and accountability.
TRRSP-PUP-2041	The Consultant shall not commence negotiations with a single source tenderer without the prior written acceptance of the Project Manager.		Ensures transparency and necessary approval.
TRRSP-PUP-2043	The Consultant shall provide documentary evidence to the Project Manager that the prices, rates or costs negotiated with a single source works Subcontractor are fair and reasonable.		Ensures that the pricing from single source subcontractors is justifiable.
TRRSP-PUP-2042	The Project Manager shall have the opportunity to be present at the opening of tenders.		Enhances transparency and integrity in the procurement process.
TRRSP-PUP-2055	The Consultant shall give the Project Manager a minimum of 5 working days' notice of the date and time of the tender openings.		To ensure the Project Manager has adequate opportunity to prepare and attend the tender openings.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-2044	The Consultant shall manage the evaluation process and provide the Project Manager with an assessment of the tenders together with an auditable recommendation for written acceptance by the Project Manager prior to sub-contract award.		To ensure transparency and accountability in subcontractor selection.
TRRSP-PUP-2045	All recommendations shall clearly identify and reconcile relevant contract budget allowances, with explanations between the recommended award value and the budget allowance.		Ensuring all recommendations reconcile with the project's budget allowances.
TRRSP-PUP-2046	Any deviations from budget allowances in award recommendation and authorisation shall be fully explained by the Consultant.		Ensuring that all financial decisions are justified and align with project objectives.
TRRSP-PUP-2056	The Project Manager shall be given a minimum of 5 working days to attend any pre-contract meetings arranged with tenderers.		To provide the Project Manager sufficient time to prepare for pre-contract meetings.
TRRSP-PUP-2047	The Project Manager shall have access to all information, records of discussions etc, associated with returned tenders.		Ensures thorough oversight and informed decision-making throughout the procurement process.
TRRSP-PUP-2048	Once selected by the Consultant and accepted by the Project Manager each sub-contract shall be placed with the selected subcontractor.		This ensures that subcontractor selection is finalised and approved by both the Consultant and Project Manager.
TRRSP-PUP-2049	Any proposed change to the list of selected subcontractors shall be notified to the Project Manager prior to being implemented.		To maintain transparency and allow for the Project Manager's oversight and approval.
TRRSP-PUP-422	**3 Engineering Safety Management Requirements**		
TRRSP-PUP-1846	The Consultant shall develop an Engineering Safety Management Plan that describes the Engineering Safety strategy and activities planned for project lifecycle phases throughout the commission.	See MDL-023- Engineering Safety Management Plan ESM to describe the following; •Engineering Safety strategy and activities planned for project lifecycle phases, including (but not limited to) preliminary hazard identification, management of hazards, assumptions and actions, transfer of hazards; •The roles, responsibilities and requisite competencies of persons undertaking ESM activities; and •The applicable safety legislation, regulations and standards, such as the ROGS. •The ESMP shall detail the scope of the project and its sub-projects, and be updated to support safety authority approvals.	CDM and ESM

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1847	The Consultant shall perform a preliminary hazard identification, which is suitable for the project lifecycle phase and proportionate to the magnitude of the change, using techniques accepted within the rail industry. This should consider all foreseeable hazards from normal, degraded and emergency modes of operation of the system and its interfaces.	See MDL-025 HazID report The preliminary hazard identification at the feasibility stages of a project, with limited detailed information could be high level. However, it will be used to support and guide: •more detailed hazard identification activities at later lifecycle stages, •options analysis and selection, and •to inform the significance assessment (safety verification).	CDM and Safety
TRRSP-PUP-1848	The Consultant shall attend and prepare all necessary material for periodic designer's engineering safety activities such as Hazard Identification (HazID) workshops to develop the design, risk and assumptions reviews etc.	See MDL-025 Hazard Identification (HazID) Report	CDM and Safety
TRRSP-PUP-1849	The Consultant shall detail engineering safety designer's risks, possible mitigation and the timescale and mechanism for closure (if applicable) within their designer's Hazard Log.	See MDL-026 Hazard Log	CDM and Safety
TRRSP-PUP-1850	The Consultant shall detail assumptions made during engineering safety activities and the timescale and mechanism for closure (if applicable) within their assumptions register.	See MDL-005 Assumptions Log	CDM and Safety
TRRSP-PUP-1851	The Consultant shall detail how designer's engineering safety risks and assumptions are being treated within the feasibility phase's estimating deliverables.	See MDL-004- Design Risk Assessment MDL-005- Assumptions Log	CDM and Safety
TRRSP-PUP-1852	The Consultant shall advise the Employer of any identified opportunities during periodic designer's risk and assumptions reviews.	See MDL-004- Design Risk Assessment MDL-005- Assumptions Log	Opportunities for programme reduction
TRRSP-PUP-1853	The Consultant shall undertake necessary engineering safety activities (which may include workshops and assessments) to develop the designer's risk assessment or safety report throughout the commission in parallel with the development of the design.	See MDL-004- Design Risk Assessment MDL-027- Safety Report	CDM and Safety
TRRSP-PUP-1854	The Consultant shall produce a designer's HazID report and hazard log, which shall be reviewed throughout the commission to enable the Consultant to close as many risks and hazards before design submissions are made.	See MDL-025- Hazard Identification (HazID) Report MDL-026- Safety Report	CDM and Safety

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1855	The Consultant shall provide a safety report, which represents the concluding understanding and agreement of all relevant actors, how hazards and associated risks related to a proposed change are suitably understood and controlled such that their residual risk is Tolerable and as low as is reasonably practicable (ALARP).	See MDL-027 Safety Report	CDM and Safety
TRRSP-PUP-423	The Consultant shall perform Design or Engineering Safety activities appropriate to the early lifecycle stage and the complexity of the proposed changes, following the risk management principles in the common safety method for risk evaluation and assessment (CSM-RA, EU Regulation No 402/2013) and ROGS.	See MDL-025- Hazard Identification (HazID) Report MDL-026- Safety Report	CDM and Safety
TRRSP-PUP-490	**4 Design Requirements**		
TRRSP-PUP-491	**4.1 General**		
TRRSP-PUP-1856	The design shall be developed in accordance with all Trams engineering standards, Building regs and associated legislative references with the inclusion of the Fire Safety Bill, British Standards and International Organization for Standardization, LT standards, Tramway Principles and Guidance (LRG1.0), unless explicitly stated in these requirements	N/A	Compliance with standards and statutory requirements.
TRRSP-PUP-1857	The design shall as a minimum retain the current level of service capability across the existing network.	N/A	System retains level of operational service
TRRSP-PUP-1858	The design shall ensure that any new infrastructure is compatible with existing infrastructure.	New equipment integration to existing system, such as connection to existing DC switchgear.	System integration and to ensure that no impact or disruption to existing system operations.
TRRSP-PUP-1859	The design shall incorporate passive future-proofing (space) measures into the design of any new or altered power infrastructure where practicable.	N/A	Future growth, good maintenance practice.
TRRSP-PUP-1860	Any new HV and traction power equipment shall be capable of providing its full rated performance and performing its intended purpose, for a minimum of 40 years, without deterioration in reliability.	Approval of concept and detailed designs, which will include asset stakeholders review. This includes any new components for altered assets but excludes consumable items and microprocessor units such as SCADA RTU components and protection relays.	To minimise need for future maintenance/ renewal.
TRRSP-PUP-1861	The current level of security at and around existing substations shall be retained as a minimum throughout all stages.	Applicable where substation extension modules are proposed	To minimise risk of theft and vandalism.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1862	The design shall identify any justifiable deviations from London Trams standards where applicable.	The product shall be designed and delivered in accordance with the requirements of all relevant British and International standards. Where the issue of each relevant British, European or International standard is not specified, the issue that is current on the issue date for this TRS shall be applied. Non-compliance to British or International standard shall be notified and justified to the Employer Where any conflicts arise between the requirements of this document and London Trams or other published standards, compliance with this document shall take precedence, except where a breach of law or unacceptable safety risk would arise. Where no relevant London Trams, British, International or Industry Standards exist, the Contractor shall propose to the Employer the standards to be applied at the tender stage.	Compliance with standards and statutory requirements.
TRRSP-PUP-534	**4.2 High Voltage Power**		
TRRSP-PUP-1863	Any substation extensions shall be provided with trackside power equipment (and required interfacing control equipment in the substation) to enable power connection to the overhead line.	LR07.001-TfL-ZZZ-RPT-IN-00082 Rev 2 System Architecture	To ensure 750 V DC traction power system function.
TRRSP-PUP-1864	Substation extensions shall comply with applicable London Trams standards regarding equipment provided, segregation, equipment layout, maintenance considerations and other power requirements.	The current LT standard is LT-IMS-ENG-760 Issue 2.	To ensure that the new power infrastructure is compliant to standards.
TRRSP-PUP-1865	Substation extensions shall as a minimum be provided with necessary traction power equipment, control and ancillary equipment as per LT-IMS-ENG-760 and the remainder of the network.	The current LT standard is LT-IMS-ENG-760 Issue 2.	To ensure correct 750 V DC traction power system function.
TRRSP-PUP-1866	Substation extensions shall be provided with mass-trip functionality and shall be integrated (by installation of physical wiring and other equipment) to the existing mass-trip hardwired system, which is currently organised in three zones.	LR07.001-TfL-ZZZ-RPT-IN-00082 Rev 2 System Architecture C2-01-01562-083 C2-01-01562-084 C2-01-01562-085	To ensure integration with existing systems.
TRRSP-PUP-1867	Substation extensions shall be provided with dedicated earth fault relay, which monitors current between substation earth and negative busbar and if setting exceeded issues a mass-trip to DC switchgear.	LR07.001-TfL-ZZZ-RPT-IN-00082 Rev 2 System Architecture C2-01-01562-088	To provide same level of electrical protection as existing system.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1868	The Consultant shall demonstrate (via substation layout drawings) that main items of equipment (i.e. DC switchgear, RMUs, TRUs, battery chargers, negative busbar, marshalling cabinets, RTUs, intertrip bypass panel, earth fault relay, track isolator interposing cabinets, LV distribution boards and changeover) and associated cable routes can fit within proposed substation footprint for any substation extensions.	Layout drawings C2-01-01562-001 C2-01-01562-010	To ensure power upgrades provide enhancements up to standards whilst keeping intervention to existing system minimal.
TRRSP-PUP-1869	The Consultant shall demonstrate sufficient maintenance clearances are provided around main equipment as per London Trams standards.	LT-IMS-ENG-760 Issue 2 LT-IMS-ENG-761 Issue 2	To ensure that the new power infrastructure is compliant to standards.
TRRSP-PUP-1870	New 750 V DC traction cables and voltage monitors shall be rated for a minimum of 1000 V DC to cater for no load voltages and overvoltages from regenerative braking.	N/A	To be able to withstand regenerative voltages from new trams and no load conditions.
TRRSP-PUP-1871	For substation capacity increases at each site, the Consultant shall identify the main existing equipment that might need to be upgraded as a result of increased continuous rating and fault levels. This will typically include DC switchgear, traction cabling and isolator switches.	M361413 GA of MM81	Existing equipment upgrades may be needed due to system capacity increase.
TRRSP-PUP-1872	Where substation modules are proposed as part of substation extension, the Consultant shall make spatial provisions for new 11 kV or 6.6 kV RMUs in a segregated area within the substation.	LT-IMS-ENG-760 Issue 2 Layout drawings C2-01-01562-001 C2-01-01562-010	To provide HV equipment as required by the standards and for system function.
TRRSP-PUP-1873	Where substations are extended, the project shall provide necessary reinforcements to negative return infrastructure to align with new substation capacity or additional power draw as a result of introduction of new trams.	Cable schedules within Seaboard Testing Records	To ensure that negative cables are rated for TRU overload capacity additionally to future train loadings.
TRRSP-PUP-1874	The interventions to TfL's power assets shall be designed and delivered taking into account minimisation of operational disruption during construction and commissioning, capital and whole life costs, and utilisation of TfL land and permitted development rights.	LT-IMS-ENG-760 Issue 2 Layout drawings C2-01-01562-001 C2-01-01562-010 Asset interventions are expected to include substation extensions, new substations and new parallel feeders. Whole-life costs include opex in the case of new or extended buildings. Ensure new asset placement is within the TfL Land boundary, if an option includes the use of 3rd party land, then land owner to be identified also.	To provide optimum solution.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1875	If any outdoor oil-filled transformer units are provided, suitable oil containment systems (e.g. bunding) and protection from flooding shall be provided in line with relevant TfL standards.	Current relevant bunding standards include S1977 A1 Containment of Spillages from Liquid Filled Equipment.	To protect the environment in case of asset failure.
TRRSP-PUP-1876	Any new switchgear, transformer rectifier units, battery charger and other equipment shall be provided with protection and control functionalities as per London Trams standards	N/A	To ensure integration with existing systems.
TRRSP-PUP-1877	Substation upgrades design shall include any necessary connections of traction cables from Isolator Switches to OLE or OLE modifications if required.	N/A	To ensure 750 V DC traction power system function.
TRRSP-PUP-1878	New HV, LV and DC switchboards shall be provided with space for a minimum of one cubicle width at each end of the switchboard to allow for future extension of the switchboard whilst maintaining walkways and access around the equipment, which matches the panel width of the newly installed equipment.	N/A	For future provision and good maintenance practice.
TRRSP-PUP-1879	Where substations are extended, access to the HV elements shall be contiguous with the existing HV elements so that a second lobby is not required.	N/A	To facilitate maintenance and minimise civil intervention.
TRRSP-PUP-626	**4.3 LV Power**		
TRRSP-PUP-1880	Low Voltage (LV) power and lighting systems in new substation modules shall comply with LT-IMS-ENG-760 and LT-IMS-ENG-663.	LT-IMS-ENG-760 and LT-IMS-ENG-663	Equipment's performance is compliant with standards.
TRRSP-PUP-1881	Where a new substation extension module is proposed, design shall include high-level proposals for provision of LV power required for domestic, control and ancillary functions.	N/A	To identify need for LV power upgrades early.
TRRSP-PUP-1882	The indicative LV power supply arrangement shall be assessed and the impact of existing LV infrastructure as a result of substation extension buildings (where applicable) shall be provided.	LV supply can come from existing LV panel in existing substation with or without modifications or if capacity not sufficient new LV supply might be needed from other Trams source nearby or DNO. Compatibility includes electrical capacity, physical space and discrimination between electrical devices, amongst other variables.	To ascertain LV supply arrangement and the impact of new building in existing LV system.
TRRSP-PUP-2015	The indicative LV power supply requirement of any proposed building extension or additional loads shall be assessed for compatibility with the existing supply.	Examine the indicative LV power supply needs for any proposed building extensions or additional loads, assessing compatibility with the existing supply based on electrical capacity, physical space, and discrimination between electrical devices.	To ensure the proposed extensions and additional loads are electrically compatible with the existing LV system, avoiding overloads and ensuring efficient distribution without compromising safety or operation.
TRRSP-PUP-648	**4.4 EMC**		

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1883	The Consultant shall conduct design development and optioneering to meet LT-IMS-ENG-865, the 'Standard for EMC'. preparing for compliance to be demonstrated in the subsequent concept design stage.	TfL standard S1222 is referred out from LT-IMS-ENG-865.	To minimise EMI risks.
TRRSP-PUP-660	**4.5 Civils**		
TRRSP-PUP-1884	Review the gathered survey information, design information and as-built drawings to identify gaps in knowledge.	N/A	To ensure project decisions are based on comprehensive and accurate data.
TRRSP-PUP-1885	Produce survey scopes to fill any gaps in knowledge of existing critical non-ground bearing structures and to gather information in areas of proposed new construction.	N/A	To ensure thorough planning and risk mitigation.
TRRSP-PUP-1886	Produce scope of works for the assessment of critical non-ground bearing structures without adequate design information (along with survey scope to facilitate assessments).	N/A	To enable accurate and effective engineering assessments.
TRRSP-PUP-1887	Critically review existing as-built drawings to determine if structures' existing envelopes can be reused.	N/A	To ensure that the reuse of existing structures is feasible and safe, minimising unnecessary construction and costs.
TRRSP-PUP-1888	Produce feasibility studies and optioneering reports for proposed building extensions, modifications or strengthening, taking into consideration the effect of these works on the existing structures and foundations.	N/A	To ensure that modifications to existing structures are viable and do not compromise the structural integrity.
TRRSP-PUP-1889	Gather information on the weights of existing equipment within the substation and provide early estimates of the proposed weights of new equipment (in particular Transformer-Rectifiers).	N/A	Ensuring safety and structural integrity. This will also allow for early accurate structural assessment and design.
TRRSP-PUP-1890	All suspended floors in existing substations to be approached with caution as will likely require full structural assessment and strengthening for the removal of existing and installation of new equipment.	N/A	Existing suspended floors are unlikely to be able to take new transformer-rectifier loads and will require substantial strengthening and temporary propping during removal/install.
TRRSP-PUP-1891	Transformer-Rectifiers to be installed on ground bearing slabs where possible in existing structures.	N/A	Reducing the risk of structural failure under operational stresses. This will also allow for delivery/removal of equipment and future relocation of machinery without the need for temporary works and strengthening.
TRRSP-PUP-1892	Transformer-Rectifiers to be strictly installed on ground bearing slabs in new structures (unless unfeasible for location).	N/A	Reducing the risk of structural failure under operational stresses. This will also allow for delivery/removal of equipment and future relocation of machinery without the need for temporary works and strengthening.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1893	Loading criteria to be developed for assessment and design of substation buildings. A preliminary area load may be required before equipment weight is known and a separate loading criteria should be applied to 'circulation areas' not loaded by equipment.	N/A	To prevent overengineered solutions and to prevent overloading and potential structural failures.
TRRSP-PUP-1894	Any cable management systems associated with the works shall be assessed for existing spare capacity.	N/A	Helps ensure new designs have adequate spare capacity.
TRRSP-PUP-1895	All new cable management systems shall be designed with 30% spare capacity.	N/A	Permits for integration of new installations efficiently and safely.
TRRSP-PUP-1896	New holes in existing structural slabs for cables to be kept to a minimum and preference given to using existing holes or new holes through non load-bearing walls	N/A	Reduces the risk of structural failure.
TRRSP-PUP-1897	New cable routes to avoid existing civils and structures assets, reusing existing cable management systems or service ducts where possible	N/A	Reduce construction costs and minimising environmental impact.
TRRSP-PUP-737	**4.6 Communications / SCADA**		
TRRSP-PUP-1898	The designs shall outline the necessary upgrades and modifications for SCADA hardware and software to accommodate the new or modified power infrastructure.	Proposals shall include: - Conceptual RTU interfaces for new substations. - Preliminary communication infrastructure specifications. - Initial software updates for the live/dead model. - Feasibility analysis for integrating controls and alarms for new power assets Reference shall be made to; LT-IMS-ENG-760 Issue 2 LR07.001-TfL-ZZZ-RPT-IN-00082 Rev 2 System Architecture	To ensure correct 750 V DC traction power system function.
TRRSP-PUP-1899	Any additional CCTV cameras shall be compatible with the existing CCTV system.	N/A	To ensure integration with existing systems.
TRRSP-PUP-1900	Any additional CCTV camera IDs shall follow current format and sequence of the existing system.	N/A	To ensure integration with existing systems.
TRRSP-PUP-1901	If any additional CCTV cameras are required, the storage capacity of the existing recording equipment will be evaluated.	N/A	To ensure integration with existing systems.
TRRSP-PUP-1902	Access to the any new asset buildings shall be controlled in the same way as existing substations and labelling for such access shall be included in the design.	N/A	To ensure integration with existing systems.
TRRSP-PUP-1903	The Consultant shall confirm via survey at each applicable site whether there is spare capacity at existing SCADA outstation/RTU to cater for proposed upgrades or whether a new Remote Terminal Unit (RTU) will be required.	LT-IMS-ENG-760 Issue 2 LR07.001-TfL-ZZZ-RPT-IN-00082 Rev 2 System Architecture.	To ensure spare capacity is available at the RTU which in turn allows SCADA works required for correct 750V DC traction power system function.
TRRSP-PUP-774	**4.7 Verification and Validation (V&V)**		

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1904	The Consultant shall produce a V&V Matrix / table detailing how each requirement in the TRS has been met.	See MDL-006-Verification and Validation Matrix. The V&V Matrix serves as a tool to link each requirement outlined in the TRS with corresponding V&V activities.	To ensure each req. has been linked to the corresponding V&V activity.
TRRSP-PUP-1905	The V&V Matrix shall contain the following information: Requirements; Consultant Owner; Verification Argument; Verification Method; Verification Evidence; Verification Status (Compliant, Non-compliant, In Progress or Not Started)	See MDL-006-Verification and Validation Matrix The V&V Matrix serves as a tool to link each requirement outlined in the TRS with corresponding V&V activities.	To ensure each req. has been linked to the corresponding V&V activity.
TRRSP-PUP-1906	Any non-compliances against the requirements shall be documented and submitted for acceptance by the Employer via the Non-Compliance Report (NCR).	See MDL-019 Non-Compliance Report (NCR) The NCR serves as a formal record of any deviations or non-compliances identified during the V&V process.	To record all assets interfacing with or involved in the proposed works that do not comply with the current regulations, Railway Safety Principles and Guidance (RSPG) and relevant standards. To state whether these assets will be (or are intended to be) compliant or non-compliant upon completion of the project and what risk the residual non-compliances pose to the safe operation of the railway applicability.
TRRSP-PUP-1907	The V&V Matrix shall be provided within 8 weeks of contract commencement for acceptance by the Employer and updated as needed throughout the project.	See MDL-006-Verification and Validation Matrix. Updates should be provided in a timely manner to ensure that the V&V Matrix remains current and accurately reflects the status of verification and validation efforts.	To ensure V&V updates are provided in a timely manner.
TRRSP-PUP-801	**4.8 CDM**		
TRRSP-PUP-1908	The Consultant shall undertake the duties of Principal Designer under CDM 2015.	The consultant shall be familiar with and adhere to the roles & responsibilities outlined in the CDM Regulations 2015.	CDM 2015 and Safety.
TRRSP-PUP-1909	The Consultant shall undertake the duties of Principal Contractor under CDM 2015.	The consultant shall be familiar with and adhere to the roles & responsibilities outlined in the CDM Regulations 2015.	CDM 2015 and Safety.
TRRSP-PUP-818	**4.9 BIM**		
TRRSP-PUP-1910	The Consultant shall comply with Exchange Information Requirements (EIR) during the commission.	N/A	Compliance with information managements TfL practices.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1911	The Consultant shall provide all drawings in native file format / CAD (*.dgn V8) as well as PDFs.	LR07.006-TfL-ZZZ-PLN-PM-00150 PiX IT Assessment (Appendix E) S1760\	Compliance with information managements TfL practices.
TRRSP-PUP-1912	The Consultant shall produce a BIM Execution Plan.	N/A	Compliance with information managements TfL practices.
TRRSP-PUP-1167	**5 Feasibility Requirements**		
TRRSP-PUP-1168	**5.1 Optioneering Approach**		
TRRSP-PUP-1913	The Consultant shall propose and agree the assessment criteria and critical success factors with the Employer, prior to any assessment of options.	N/A	To obtain the optimum solution.
TRRSP-PUP-1914	The Consultant shall undertake rough order of magnitude constructablity assessments of all design options, which will include assessment of: • Construction complexity; • Operational and maintenance impact (throughout life cycle including decommissioning, construction, access and operational service); • Design; • Life cycle costs; • Land take; • Environmental impact and carbon reduction;	ROM constructability Assessment to be carried out prior to SPO selection.	To ensure all aspects of design are considered prior to concept stage.
TRRSP-PUP-1915	The Consultant shall circulate all material for the option selection workshops to the Employer 2 working days before the date of the workshop, which shall include prepopulated scores and commentary to aid discussions.	N/A	To ensure TfL has sufficient time to review and comment prior to workshops.
TRRSP-PUP-1916	The Consultant shall circulate minutes and workshop scoring from the option selection workshops for Employer acceptance 1 week after the date of the workshop.	N/A	To ensure accuracy of workshop discussions and decisions and to allow actions to be carried out in a timely manner.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1917	The Consultant shall facilitate two rounds of option selection workshops including but not limited to: A presentation of the assessment completed on each layout option to act as the evidence base to inform option scoring Mediating the scoring exercise and providing impartial challenge to scoring where relevant Substantial recording of rationale associated with all scoring undertaken Allowance of two weeks shall be made for any comments to be received from the Employer in regards to the optioneering commentary and scoring	N/A	To ensure TfL have a clear understanding of all proposed options whilst optimising the scoring process.
TRRSP-PUP-1918	The substation upgrade optioneering shall consider the wider network implications and interfaces between each upgrade option considered, requiring a collective consideration too in line with the scenarios in the power modelling reports.	N/A	To ensure the consultant has considered the implications of all power related interfaces and scenarios within design.
TRRSP-PUP-1206	**5.2 Substations and Therapia Lane depot**		
TRRSP-PUP-1919	For Belgrave Walk, Oaks Road, Mitcham Junction, and Addington Village, the Consultant shall provide a minimum of two main upgrade options per substation. One option will include provision of an additional transformer rectifier unit permanently in service and the other option upgrade of the existing transformer rectifier unit with larger rating and minimum 2 sub options for each main option.	Upgrading an existing unit with larger rating has the advantage of not having to introduce new extension module with power equipment next to existing, but more modifications to existing equipment will be required. Sub-options could include combinations of outdoor TRU equipment or indoor within new module. If applicable the options shall specify how the new TRU will be connected to the existing system i.e. via direction connection to extension panel of existing DC switchgear, or via connection of new DC switchgear to extension panel of existing DC switchgear or via connection from new DC switchgear to modifier Track Isolator Switch or via connection from new DC switchgear to new Track Isolator Switch or other.	To ensure optimal option has been selected for each site whilst meeting capacity increase required from modelling for new trams operation.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1920	For East Croydon, Dundonald Road and Beckenham Junction the Consultant shall provide one upgrade option per substation which includes provision of an additional transformer rectifier unit permanently in service, and minimum 2 sub options for each site.	Sub-options could include combinations of outdoor TRU equipment or indoor within new module. If applicable the options shall specify how the new TRU will be connected to the existing system i.e. via direction connection to extension panel of existing DC switchgear, or via connection of new DC switchgear to extension panel of existing DC switchgear or via connection from new DC switchgear to modifier Track Isolator Switch or via connection from new DC switchgear to new Track Isolator Switch or other.	To ensure optimal option has been selected for each site whilst meeting capacity increase required from modelling for new trams operation.
TRRSP-PUP-1921	For Therapia Lane substation upgrades, the depot shall be able to be supported for loss of one rectifier.	N/A	System resilience.
TRRSP-PUP-1922	For Therapia Lane depot trackside upgrades, for alternative feeding under loss of one section (i.e. circuit breaker, positive cable or isolator switch) the remaining healthy section shall be able to feed the whole depot load.	N/A	System resilience.
TRRSP-PUP-1923	For Therapia Lane depot substation, the Consultant shall design a new substation module at suitable location within the substation compound and in the vicinity with existing substation to facilitate integration, maintenance and to minimise cable routes. Minimum of two options for location of new substation module shall be provided.	N/A	To minimise CAPEX from cable route installation and OPEX from simplification of maintenance.
TRRSP-PUP-1924	For Therapia Lane depot trackside, the Consultant shall provide design proposals for upgrading positive cables from substation DC switchgear to yard isolator switches, for upgrading depot yard isolator switches and cables as per this section and as detailed in document LR07.001-TfL-POW-RPT-TC-00106 2.0 for Scenario B. To include upgrades of positive cable from substation 12 DCF DS to the shed, shed negative return cable and shed positive cable between shed OLE switches.	Power upgrades required to cater for N-1 scenarios. Depot shed upgrades required to cater for worst-case stabling scenario.	System resilience and Eletric Track Equipment upgrades required to support new trams.
TRRSP-PUP-1925	The Consultant shall undertake review of current depot sectionalisation for end state loading and shall undertake optioneering for re-sectionalisation in order to minimise depot yard upgrades required due to expected increased auxiliary loads from the new trams and increased numbers of trams during the fleet migration.	Therapia Lane Electrical Feeding Diagram LTCORE-LT-OO-LT000_1-DR-K-0002	For rebalancing and optimisation of power losses due to proposed reinforcements and new loadings due to new trams

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1926	The rating of the negative return cables shall be such that they can accomodate the normal, fault and overload capability of the total substation TRU capacity.	Confirmation that the negative cables from negative busbar to track in each relevant substation are capable to carry current in line with the overload capability of the total upgraded TRU rating. Table 3 and Table 4 of TRS.	This ensures the cables are of sufficient size to support the load and performing calculations for any cable upgrades proposed.
TRRSP-PUP-1295	**5.3 Electrical Sections**		
TRRSP-PUP-1927	The Consultant shall develop a minimum of two initial options for delivering the positive 750 V DC traction cable reinforcement for each electrical section upgrade required.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	For selection of optimal option that takes into account minimisation of civil cost whilst complying with standards and good practices.
TRRSP-PUP-1928	The electrical section options presented by the Consultant shall consider all relevant engineering system infrastructure required to enable the proposition.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	To ensure existing system constraints are taken into account and effect of proposals to operational tramway is minimised.
TRRSP-PUP-1929	New trackside 750 V DC traction cables shall be installed in suitable cable containment. Relevant design and installation practices are provided in standards in section 7.11 and Network Rail standard 'Specification for installation of cable routes forming part of the traction distribution system' NR/SP/ELP/27224.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	Good industry practice, easier maintenance and minimisation of EMC issues.
TRRSP-PUP-1930	The Consultant shall provide civils design for any new cable routes required for the positive cable reinforcements.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	For selection of optimal option that takes into account minimisation of civil cost whilst complying with standards and good practices.
TRRSP-PUP-1931	Positive 750 V DC traction cables shall be routed in dedicated cable containment, separate from negative traction cables, control/LV cables, and HV cables.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	Good industry practice, easier maintenance and minimisation of EMC issues.
TRRSP-PUP-1932	For cable route design proposals, up to 2 positive 750 V DC traction cables shall share the same cable containment.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	Good industry practice, easier maintenance and minimisation of EMC issues.
TRRSP-PUP-1933	New positive 750 V DC traction cables shall be a minimum of 240 sqmm Cu as indicated in the power modelling.	Applicable to electrical cable sections plus for any short trackside cable routes required for substation upgrades.	To provide adequate reduction of voltage drop.
TRRSP-PUP-1338	**5.4 DC Protection**		
TRRSP-PUP-1934	Every DC electrical section on the Trams shall be protectable for normal, alternative feeding and every migration state while supplying the required load with only non-service affecting levels of nuisance tripping.	N/A	Electrical safety and asset protection.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1935	All DC track feeder circuit breakers and protection relays shall as a minimum provide instantaneous overcurrent protection coverage for 100% of the section they are feeding under normal feeding.	To provide protection coverage in the event of adjacent substation being out of service. For illustration an example is provided using Figure 3 above, Dundonald Road substation DC track feeder circuit breaker 15 DCF BD instantaneous overcurrent shall as a minimum protect the whole green section BD. Belgrave Walk DC track feeder circuit breaker 14 DCF BD shall as a minimum protect the whole green section BD.	Electrical safety and asset protection.
TRRSP-PUP-1936	For N-1 substation outage bypass feeding shall be considered. For dually fed sections, it is acceptable that under substation bypass the remaining healthy circuit breaker to provide the only instantaneous overcurrent protection (i.e. it is not expected that the fault will be seen by the adjacent healthy track feeder circuit breaker). Once the nearest circuit breaker trips, the intertrip bypass wiring will transfer intertrip to the adjacent substation circuit breaker to avoid feeding the fault.	N/A	Electrical safety and asset protection.
TRRSP-PUP-1937	As exception, for single fed section EC, under an East Croydon substation bypass, instantaneous overcurrent protection coverage for a fault anywhere at EC shall be provided by at least one of the two adjacent substation circuit breakers at any given time: Jubilee Bridge track feeder circuit breaker 11 DCF EJ or Sandilands substation track feeder circuit breaker 02 DCF ES.	N/A	Electrical safety and asset protection. Single fed section.
TRRSP-PUP-1938	The report shall include indicative instantaneous overcurrent settings for each track feeder circuit breaker and proposed infrastructure upgrades to eliminate discrimination issues where required.	To ensure discrimination can be achieved between traction load and minimum fault currents. The proposed infrastructure upgrades (increase in TRU capacity and parallel reinforcement) will increase the minimum fault levels slightly. A challenge exists in Trams network due to the minimum fault current under N-1 conditions being very low (high OLE resistance is contributing to this issue) and possible inability to provide protection settings that give adequate coverage. The aim is to have no unprotected sections whilst minimising nuisance tripping.	Electrical safety and asset protection.
TRRSP-PUP-1939	If Direct Acting Overload (DAOL) is the primary overcurrent it shall be set with a minimum of 500 A margin below the minimum fault level.	If DAOL is not the primary then only the accuracy of DC protection relay is to be taken into account.	Due to inaccuracy of DAOL.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1940	The maximum instantaneous tram load shall be a minimum of 500 A below the lowest instantaneous overcurrent setting.	Alternative to Figure 3.1 of 329354/RTS/RCR/011/A September 2015 Traction Power - Additional Protection Study for BGW and DDR.	To reduce risk of nuisance tripping.
TRRSP-PUP-1941	The report shall include relevant input data used (such as resistance of cables, OLE, rectifiers, running rails) and assumptions.	N/A	To facilitate review and future use.
TRRSP-PUP-1942	The minimum fault currents shall be calculated taking into account TRU capacity upgrades at Dundonald Road, Belgrave Walk, Mitcham Junction, Beckenham Junction and Therapia Lane substations and proposed parallel positive reinforcements at sections WL, OA and AP are in place.	i.e. increase of TRU capacity and positive parallel reinforcements excluding East Croydon, Oaks Road and Addington Village substations.	Electrical safety and asset protection.
TRRSP-PUP-2031	The Consultant shall produce a DC Protection Assessment Calculation and Proposed Upgrades report.	This assessment shall be for all DC track feeder circuit breakers on the system and shall focus on whether instantaneous overcurrent protection (provided by Direct Acting Overload and electronic protection relays) can be provided without nuisance tripping due to increased service currents (as a result of new Trams). In sections where discrimination cannot be achieved, high-level proposals for positive and/or negative circuit reinforcements to decrease resistance or other DC protection measure shall be provided. Maximum instantaneous DC traction currents for increased loading due to New Trams for all circuit breakers will be provided by TfL.TfL will provide DC protection settings upon Consultant's request. Depot track feeder circuit breakers 12 DCF DW and 12 DCF DE are to be excluded from this assessment.	
TRRSP-PUP-1398	**5.5 Record requests**		
TRRSP-PUP-1943	The Consultant shall inform the Employer of any records or other required to undertake these works within 2 weeks of contract award.	The Consultant has been provided with as-built drawings for the affected electrical assets. These have been detailed in appendix D.	Early communication of required records or resources allows the Employer to make necessary arrangements.
TRRSP-PUP-1944	The Consultant shall inform the Employer of any asset information/data required to undertake these works in timely manner.	N/A	Early communication of asset info./data allows the Employer to facilitate access to necessary resources.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1945	The Consultant shall inform the Employer of any non-asset information/data required to undertake these works in a timely manner.	N/A	Early communication of non-asset info./data allows the Employer to facilitate access to necessary resources.
TRRSP-PUP-1946	The Consultant shall engage with the Employer to discuss and agree appropriate mitigation for the non-availability or inaccuracy of any records, asset information/data and non-asset information/data.	N/A	Agreeing on appropriate mitigation strategies helps mitigate risks associated with incomplete or inaccurate information.
TRRSP-PUP-1947	The Consultant shall use all buried services/utilities information available to provide the Employer with an interpretation of existing and potential buried services/utilities and third-party interfaces through the submission of a combined service drawing.	N/A	Providing the Employer with an interpretation of existing and potential buried services/utilities allows for proactive planning and mitigation of potential conflicts or disruptions.
TRRSP-PUP-1948	The Consultant shall identify and discuss with the Employer any requirement to divert or relocate any existing or proposed utility services.	Identification of requirements for diverting or relocating utility services should occur during project planning or design stages.	Early identification and discussion of utility service diversion or relocation requirements enable proactive planning and mitigate potential delays or disruptions during construction.
TRRSP-PUP-1949	The Consultant shall seek to limit the impact on buried services/utilities where possible through innovative design proposals where appropriate.	The Consultant must actively seek opportunities to limit the impact on buried services/utilities during project planning and design phases.	Minimising the impact on buried services/utilities reduces the risk of damage or disruption during construction.
TRRSP-PUP-1950	Where an impact on buried services/utilities is demonstrated to be unavoidable, the Consultant shall support the Employer with engagement with utilities providers to assess appropriate options for mitigation and/or diversions/relocations.	In situations where impacting buried services/utilities is deemed unavoidable, the Consultant is tasked with assisting the Employer.	Evaluation of mitigation options enables informed decision-making
TRRSP-PUP-1951	The Consultant shall include final details of impacted buried services/utilities and associated mitigation, diversions or relocation in the relevant engineering deliverable for acceptance by the Employer.	Final details of impacted buried services/utilities and any associated mitigation, diversions, or relocations into the relevant engineering deliverable.	All relevant information regarding impacted buried services/utilities and mitigation measures is documented for reference during project execution.
TRRSP-PUP-1952	The Consultant shall include any assumptions regarding buried services/utilities within their assumptions register for periodic Employer review.	The Consultant is obligated to include any assumptions regarding buried services/utilities within their assumptions register.	Including buried services/utilities assumptions in the register supports effective risk management.
TRRSP-PUP-1953	The Consultant shall ensure assumptions regarding buried services/utilities are closed by the end of Concept Design as far as reasonably practicable.	The Consultant is responsible for ensuring that assumptions regarding buried services/utilities are addressed and closed to the extent reasonably practicable by the end of the Concept Design phase.	Addressing assumptions early in the project lifecycle allows for more accurate planning and estimation.
TRRSP-PUP-1463	**5.6 Environmental Requirements**		

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1954	The Consultant shall review the Environmental Evaluation and highlight in an Environmental Evaluation Review Report any additional risks or opportunities, and propose any additional actions that may be required to address these.	An Environmental Evaluation (Appendix F) has previously been undertaken to identify any potential environmental risks and opportunities that may be assocaied with the project, and to identify actions that should be undertaken during the project's lifecycle to address these.	Highlight any additional environmental risks or opportunities.
TRRSP-PUP-1955	Within the Environmental Evaluation Review Report the Consultant shall identify any additional opportunities to help deliver the five themes in TfL's Corporate Environment Plan. In particular, the Consultant shall seek opportunities to reduce whole life carbon and incorporate green infrastructure.	TfL has published its Corporate Environmental Plan to set out our aspirations and targets for improving environmental performance. The Corporate Environmental Plan has five key themes: sustainable resources, green infrastructure, climate emergency, air quality and best environmental practice, and all projects should endeavour to deliver the aspirations set out under these themes, where relevant.	To ensure TfL delivers commitments in the Corporate Environment Plan.
TRRSP-PUP-1956	The findings arising from completing E01 and E02 above shall be presented in the Environmental Evaluation Review Report.	N/A	Demonstrate compliance with the requirements ER01 and ER02 above.
TRRSP-PUP-1957	The design shall incorporate energy / carbon efficient measures into the design of any new or altered power infrastructure where practicable.	Corporate Environment Plan	To ensure TfL delivers commitments in the Corporate Environment Plan.
TRRSP-PUP-1958	The design shall incorporate environmentally beneficial measures into the design of any new or altered power infrastructure where practicable.	Corporate Environment Plan	To ensure TfL delivers commitments in the Corporate Environment Plan.
TRRSP-PUP-1959	The Consultant shall complete a desktop Ecology study, using data sourced from, but not limited to the Greenspace Information for Greater London CIC (GiGL) for all areas potentially impacted by the project, including the proposed cable reinforcement routes and substation/depot sites.	GiGL is an authoritative source of information offering a data search service for those seeking robust biodiversity and open space information for a specific area of Greater London.	By conducting the study, the Consultant will gather valuable data to inform biodiversity management strategies and mitigation measures. This includes an assessment of the feasibility of aiming for a 10% net gain in biodiversity in line with TfL's Corporate Environmental Plan.
TRRSP-PUP-1960	The design shall embed the Infrastructure Carbon Review principles of Build Nothing, Build Less, Build Clever and Build Efficiently into all decision making to minimise whole life cost and whole life carbon.	Corporate Environment Plan	To ensure TfL delivers commitments in the Corporate Environment Plan.
TRRSP-PUP-1961	The design shall ensure no impact to buried archaeology.	Corporate Environment Plan	To ensure TfL delivers commitments in the Corporate Environment Plan.
TRRSP-PUP-1962	Construction / modification of any power infrastructure shall prevent waste generation and maximise reuse and recycling in accordance with the Waste Hierarchy.	Corporate Environment Plan	To ensure TfL delivers commitments in the Corporate Environment Plan.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1963	In line with the PUP being categorised as Standard, the Consultant shall consider whole life carbon within the design development and complete the TfL Carbon & Resource Plan template.	Corporate Environment Plan	To ensure TfL delivers commitments in the Corporate Environment Plan.
TRRSP-PUP-1522	**5.7 Surveys**		
TRRSP-PUP-1964	The Consultant shall undertake site access arrangements in accordance with the Trams Network Rules and Appendices, including any mandatory safety critical training.	Ensure the necessary work request forms and approval gained prior to accessing the site. See Network Rules (Appendix J)	Network rules compliance and site safety
TRRSP-PUP-1965	The Consultant shall indicate how they will utilise any requested access to facilitate its design and carry out the required surveys.	Ensure the necessary work request forms and approval gained prior to accessing the site. See Network Rules (Appendix J)	Network rules compliance and site safety
TRRSP-PUP-1966	The Consultant shall provide all required safety critical staff and access planning functions required to meet the access requirements in line with the Network Rules and Appendices.	Ensure all access requirements are met. See Network Rules (Appendix J)	Network rules compliance and site safety
TRRSP-PUP-1967	The Consultant shall identify and advise the Employer of appropriate possession access deemed required to facilitate surveys. If possession is required (intrusive surveys) the Consultant shall arrange for possession as per Network Rules (Appendix J).	The consultant must determine and inform the employer about the necessary access arrangements for conducting surveys. See Network Rules (Appendix J)	Network rules compliance and site safety
TRRSP-PUP-1968	The Consultant shall obtain any other permissions or consents to access any land required as part of this contract, including third party land. The Employer shall be informed in advance of any third-party requests being made.	Ensure new asset placement is within the TfL Land boundary, if an option includes the use of 3rd party land, then land owner to be identified also. See Network Rules (Appendix J)	Network rules compliance and site safety
TRRSP-PUP-1969	The Consultant shall advise the Employer of recommended surveys to be undertaken in subsequent design stages.	List of current identified surveys are found in MDL (Appendix A)	Programme and project opportunity, scope creep risk mitigation
TRRSP-PUP-1970	The Consultant shall provide a work request form and risk assessment and method statement for TfL approval whenever they are on-site undertaking inspections, survey or other works.	As per Network rules which can be found in Appendix J of the TRS. See Network Rules (Appendix J)	To ensure all necessary parties are informed and a safe systems of work is place.
TRRSP-PUP-1971	The condition of affected or interfacing assets shall be captured on site during visual inspections via a dilapidation report.	State of good repair.	To identify safety risks with works being affected by existing assets in poor conditions.
TRRSP-PUP-1972	Consultant shall provide resources including a person in charge of works, with required competencies which include but not limited to Tramway Possession Supervisor, Tramway Worksite Supervisor and Authorised Person.	As detailed in Network Rule 7 – Competency and resource requirements, As per Network rules which can be found in Appendix J of the TRS.	Principal contractor responsibility.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1973	The Consultant shall conduct physical on-site check survey to use a combination of existing data and new measurements to confirm dimensions (or any omissions) of as-built drawings both inside and outside the existing substations.	To include: 1. Interior Survey- verify dimensions of existing structures, equipment layouts, and clearances inside the substations (as in the as-built drawings). 2. Exterior Survey- Verify dimensions of external structures, access points 3. Any omissions or new measurements	The on-site survey is essential for building confidence in the asset data currently held and any potential new equipment, for future design choices. Purpose of installing key equipment within the substations.
TRRSP-PUP-1974	The Consultant shall assess space constraints within/near the existing substations to determine suitable options for the Transformer Rectifier Unit (TRU) installation. This assessment shall include: 1. Space Evaluation: Evaluate available space within/near the substations, considering spatial limitations and clearance requirements for TRU installation. 2. TRU Options Assessment: Identify potential TRU options from a manufacturer and assess their compatibility with the available space constraints, ensuring minimal margin for error in housed components.	This assessment is crucial due to minimal margin for error in housed components and the requirement for TRU options. Need dimensions of proposed new assets and confirmation they can fit within the options. The products of the manufacturer of the existing TRUs shall be included in this assessment, but it should not be limited to them.	Identifying TRU options compatible with space constraints
TRRSP-PUP-1976	The Consultant shall conduct a on-site ground investigation to include but not limited to presence of buried services, properties of the soil (see supporting info.), ground angles, elevations, ground stability and other relevant factors.	If needed, the consultant will also check soil resistivity for the earthing system design, especially if the existing system needs reinforcement.	The objective is to provide recommendations for easier construction - Ground investigation ensures safety and stability for new modules near the substation. - Soil resistivity measurements are key if existing earthing system needs reinforcing for safety standards.
TRRSP-PUP-1979	In addition MDL-034, where the Consultant is proposing extension to existing buildings or the creation of new buildings they shall conduct a topographical survey of the substation and land adjacent.	Conducting a topographical survey (MDL-034) - Completing visual inspections of existing impacted assets, noting any constraints or considerations for new asset placement.	To assess available land and space for any new asset. Aimed at assessing the terrain and available space for potential new asset.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1980	The interventions to TfL's power assets shall be designed and delivered taking into account minimisation of operational disruption during construction and commissioning, capital and whole life costs, and utilisation of TfL land and permitted development rights.	LT-IMS-ENG-760 Issue 2 Layout drawings C2-01-01562-001 C2-01-01562-010 Asset interventions are expected to include substation extensions, new substations and new parallel feeders. Whole-life costs include opex in the case of new or extended buildings. Ensure new asset placement is within the TfL Land boundary, if an option includes the use of 3rd party land, then land owner to be identified also.	To provide optimum solution.
TRRSP-PUP-1626	**6 Early Contractor Involvement (ECI) Requirements**		
TRRSP-PUP-1628	**6.1 Constructability**		
TRRSP-PUP-1981	The Contractor (as appointed by the consultant) shall undertake the detailed constructability workshop(s) for the design of the single preferred option, which will include the following aspects: • Phasing and priority order of site works to support tram rollout; • Construction sites required for the works; • Compound/satellite compounds required for the works; • Crane locations; • Any possessions of the Trams network; • Demolition; • Road Closures / realignment; • Adjoining construction sites/interfacing works; • Installation and lifting of TRU into position;	There will be a number of construction and logistical challenges to manage to construct the required new infrastructure.	To facilitate constructible design and mitigate project/design risks.
TRRSP-PUP-1982	The Contractor should provide details of any constraints identified in their review of the Site Information and Works Information, explaining how these could impact the works and outlining their proposed mitigations.	N/A	To facilitate constructible design and mitigate project/design risks.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1983	The Contractor shall identify viable locations to act as a site compound and shall propose a layout which includes consideration of, but not limited to, the following elements: Welfare; Office; Stores; Material lay down; Access/egress and control Cognisance of the construction traffic route assessment How materials and labour will be transported from the construction compound to the work site.	N/A	To ensure constructible design solution.
TRRSP-PUP-1984	The Contractor should identify any expected long lead materials, plant, resources or subcontractors and provide confirmation of expected lead times.	N/A	To mitigate project and programme risks.
TRRSP-PUP-1985	The Contractor shall provide a detailed, step by step, description of how the Main Construction Works associated with this project will be delivered.	N/A	To ensure constructible design solution.
TRRSP-PUP-1986	The Contractor shall identify a possession strategy for implementation.	N/A	To ensure constructible design solution.
TRRSP-PUP-1987	To support the Employer's deliverability assessment, the Contractor is required to produce a delivery programme.	N/A	Programme acceptance.
TRRSP-PUP-1988	The Contractor shall prioritise and programme the substation upgrades of Dundonald Road and Belgrave Walk, prior to Beckenham Junction.	N/A	Substation more critical to system resilience.
TRRSP-PUP-1989	Where isolations are required in a possessions, the Consultant shall produce Electrical Switching Forms (ESF) for each substation or trackside cable route (intrusive survey) for TfL approval.	As per Network rules which can be found in Appendix J of the TRS.	To ensure all necessary parties are informed and a safe systems of work is place.
TRRSP-PUP-1681	**6.2 Estimating**		
TRRSP-PUP-1990	The Contractor shall produce a cost estimate compliant with the Rail Method of Measurement that is reflective of the further feasibility design work and the work carried out to satisfy the Constructability Requirements (CR01 to CR07)." It is not necessary to provide an assessment of sunk costs..	N/A	Incorporating further feasibility design work into the cost estimate ensures that the financial projections are based on the most up-to-date and detailed design information. This accuracy is crucial for making informed financial decisions and securing appropriate funding.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1991	The Contractor shall ensure that all Designer's Risks are consistent and costed.	N/A	Assigning costs to each identified Designer's Risk ensures that the financial implications of potential risks are understood and planned for. Ensuring that all Designer's Risks are consistently identified guarantees that the risk management process is thorough and systematic. Consistency in risk identification helps in preventing oversight of potential risks
TRRSP-PUP-1992	The Contractor shall ensure that all estimating and design assumptions are consistent and costed.	N/A	Ensuring consistency in estimating and design assumptions helps maintain uniformity across the project, reducing the likelihood of discrepancies and misunderstandings. Consistent assumptions provide a reliable foundation for all project activities.
TRRSP-PUP-1993	The Contractor shall clearly document how outstanding design assumptions are being treated in the estimate.	N/A	Clearly documenting the treatment of outstanding design assumptions ensures transparency and clarity in the estimation process. This helps stakeholders understand how uncertainties are being managed and incorporated into the project's financial planning.
TRRSP-PUP-1994	All estimates provided by the Contractor shall be in TfL Estimating Report Format and shall be Excel file format only (Appendix K).	N/A	Using the TfL Estimating Report Format ensures that all estimates are presented in a standardized manner, promoting consistency across all project documentation. This standardization facilitates easier comparison, review, and integration of estimates.
TRRSP-PUP-1995	The Contractor shall support an estimate assurance process which will be conducted on behalf of the Employer through TfL Estimating.	N/A	Ensure consistency, accuracy and reliability of estimates.
TRRSP-PUP-1996	The Contractor shall undertake regular cost reviews with their Cost Consultant and the Employer to review any emerging cost implications/challenges associated with the developing design and discuss possible mitigations.	N/A	Regular cost reviews allow for proactive identification and management of emerging cost implications and challenges. By addressing potential issues early in the design phase, the Consultant can implement timely mitigations to prevent cost overruns and delays.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-1997	The Contractor is to produce estimates for the works including all temporary and permanent works costs, Employer costs, land and legal fees, license fees, charges, statutory costs, compensations, planning permission and the like. Land costs will need to be confirmed by TfL Operational Property.	N/A	A well-defined estimate ensures all necessary resources and deliverables are accounted for and help prevent over-spend and delays. This also improves transparency helping to provide justification for project spend.
TRRSP-PUP-1998	The design team and TfL estimator shall be consulted during the preparation of the bill to ensure that the full extent of works is understood.	N/A	Ensures the contractors proposal reflects the project technical requirements and the cost estimate is in line with market rates.
TRRSP-PUP-1999	Where necessary, the Contractor shall engage with appropriate specialists, including subcontractors and suppliers, to properly interpret all the data available and ensure that quantities accurately reflect the works required.	N/A	Ensures the technical accuracy of the final estimates by incorporating expert knowledge and insights.
TRRSP-PUP-2000	The Contractor shall provide a supporting detailed bill of quantities / schedule of rates or agreed detailed pricing document.	N/A	Detailed BoQ/Schedule rates provide clear visibility into the cost structure detailing where and how funds are being allocated. This also allows precise tracking of project expenses aiding the management of the project budget.
TRRSP-PUP-2001	The estimate shall reflect accurate current prices, based upon: Quotations and other advice from contractors, subcontractors and other industry specialists; Known, accurate, industry data; Outturn costs of comparable projects; Any other information which may more accurately inform current pricing.	N/A	Accurate pricing establishes a realistic budget that can be effectively managed and reduces the risk of budget overrun due to the use of current pricing.
TRRSP-PUP-2002	Before the estimate is issued to the Employer, a full internal review (QA) should be carried out by the Contractor and the Consultant.	N/A	Leverages diverse expertise to identify potential issues and ensure all aspects of the project are accurately reflected in the estimate.
TRRSP-PUP-2003	The Contractor shall investigate innovative design and construction solutions that have the potential to lower the project's whole life cost.	N/A	Encourages proactive exploration of alternative approaches to optimise project outcomes. Presents opportunities to lower cost by identifying more efficient and cost effective solutions.
TRRSP-PUP-2004	The Contractor shall demonstrate how whole cost has been reduced throughout the development and delivery of the solution.	N/A	Ensures the cost reduction strategies are realistic and achievable.
TRRSP-PUP-2005	The Contractor shall undertake value engineering on the SPO Designs to demonstrate value for money.	N/A	Initiates process of optimising cost while maintaining or enhancing project quality and constructability.

ID	Requirement Text	Supporting Information	Rationale
TRRSP-PUP-2006	The Contractor shall carry out a comparison against the historic and current project estimate (Appendix G) and include a breakdown on the cost reconciliation tab of the TfL cost estimate template.	N/A	Allows for identification of discrepancies and trends within the cost estimates over time, aiding in cost management & optimisation.
TRRSP-PUP-2007	The estimate shall be produced in such a way that the Employer will be able to identify and if necessary remove costs that are specific to each identified and included SPO.	N/A	Enables the client (TfL) to understand the composition of the project cost and identify specific items that may be removed or adjusted.
TRRSP-PUP-1779	**6.3 Value Engineering**		
TRRSP-PUP-2008	The Contractor shall produce a Value Engineering Report to summarise any areas of the design that can be optimised or any alternative construction methodologies.	It is likely that through the production of the other deliverables required as part of this package and review of the SPOs that the Contractor will identify areas of the design that can be optimised, or alternative construction methodologies. The Employer requires that the Consultant produces a report summarising these opportunities, which will be discussed with the Employer to consider whether any opportunities should be incorporated into the base project and reflected in the updated cost estimate and estimated final cost (EFC) for the project.	Optimising design solution considering technical, safety, maintenance and cost considerations.
TRRSP-PUP-2009	The Contractor shall facilitate 1 No. 2 hour Value Engineering workshop to help identify areas of the design that can be optimised and/or altered to drive through and realise efficiencies.	Realise efficiencies during future design development and construction.	Optimising design solution considering technical, safety, maintenance and cost considerations.
TRRSP-PUP-2010	Subject to agreement with the Employer, the opportunities shall be incorporated into the base project and reflected in the updated design drawings and cost estimate for the project.	N/A	Optimising design solution considering technical, safety, maintenance and cost considerations.

Appendix A	Master Deliverables List (MDL)
Appendix B	Power Modelling Report – 36 Tram Fleet, SPG-VCP-RPT-TRL-001
Appendix C	Power Modelling Report – 40 Tram Fleet, SPG-VCP-RPT-TRL-002
Appendix D	Existing Tram As-Built Records
Appendix E	Exchange Information Requirements (EIR) & PIX Assessments
Appendix F	Environmental Evaluation
Appendix G	Cost Estimate
Appendix H	Renewal Project Workbank
Appendix I	Pre-Construction Information Pack
Appendix J	Network Rules and Appendices
Appendix K	TfL Cost Estimate Template
Appendix L	Architectural Design Description (ADD)
Appendix M	Power Calculation Summary

Month	Deliverables	[redacted]
January	Asset Condition Assessment / Dilap Survey and Report	
	Topographical survey	
	On-Site Comparison Survey with Existing Data	
	Assessment of Space Constraints for TRU Installation	
	On-site Ground Investigation	
	SCADA System Capacity	
February	Asset Condition Assessment / Dilap Survey and Report (continued)	
	On-site Ground Investigation (continued)	
March		
April		
May	Ecology survey	

PUP Feasibility - Clarifications during tender response period

Question Ref	Date Raised	Subject	Question	Answer Ref	Date Responded	Response
Q1.1	27.06.24	Pricing Schedule	Within the Pricing Schedule, the Option E Level of Effort sheet appears to be locked for editing and requires a password, can this please be provided and can it be confirmed the populated Contract Role, Role and Days can be amended as the template is pre-populated. Thank you.	1	27.06.24	Only column C can be edited on the Option E level of effort sheet. The Contract Role, Role and Days cannot be amended and are protected cells.
Q2.1	1.07.24	Pricing Schedule	Please can TfL confirm whether we should amend the number of days stated within tab Option E Level of effort of tfl_scp_002389_Vol_1_Pricing_Schedule or whether they should remain as is?	2	1.07.24	Only column C can be edited on the Option E level of effort sheet. The Contract Role, Role and Days cannot be amended and are protected cells.
Q3.1	1.07.24	Extension	Due to the change in contract to Long form, we request prolonged contractual approvals, would it be possible to extend the deadline by two weeks to satisfy internal governance?	3	1.07.24	Due to the programme timescales, unfortunately, the tender response window cannot be extended
Q4.1	1.07.24	TRS	The PUP Feasibility Technical Requirements Specification_V2.2 states as per TRRSP-PUP-2033 'The appointment of any subcontractor shall be done on an open book basis.'. Please can you confirm whether sub-contractors	4	1.07.24	This applies to sub-contractors appointed once the feasibility contract is in place.

			used within our Tender response need to be open book for the T&M elements only or whether this only relates to sub-contractors appointed once a supplier has been appointed.			
Q5.1	1.07.24	TRS	TRRSP-PUP-1990 refers to constructability requirements CR01 to CR07 - please confirm this is actually a reference to TRRSP-PUP-1981 to 1989 inclusive.	5	1.07.24	Correct. Thank you for raising this typo.
Q6.1	1.07.24	TRS	MDL-030 states that Ecology surveys are to be used to establish the ecological baseline for the Net Gain Assessment. MDL-035 describes the Ecology surveys as desktop. Could the Client confirm that their expectation is that the Net Gain assessment is to be based on the desktop ecology surveys from MDL-035 and not in person site surveys.	6	1.07.24	Correct. Ecology survey to be desktop only at this stage.

PUP Feasibility – Clarifications with Mott MacDonald Limited

	Mott MacDonald	
Question Ref	**TfL Question**	**MM Answer**
1	Option E Level of Effort - all of the blank roles need to be assigned a rate in order to produce the overall cost for the sheet. The roles have been deemed relevant for the commission. Please will you resubmit the Level of Effort sheet.	Please see 'tfl_scp_002389_Mott_MacDonald_Financial_Submission_B_v2' for a revised 'Option E Level of Effort' tab with rates assigned to every role.
2	For MDL-14, the figures do not match in the MDL list and in the Executive Summary on the commercial summary in the Pricing Schedule, please can you itemise what you envisage including for this requirement	The two figures don't match because the figures in the MDL include for the following spread across each of the items proportionately: -Meetings -Engineering Management -Project Management -Review of existing documentation-Stakeholder Engagement
3	Please confirm that the figure for MDL15 that you have estimated includes the review from Fire Engineers for option designs for compliance with relevant British standards for fire safety and evacuation and is estimated as [redacted] and the report is estimated at [redacted]	Yes, we have included for Fire Engineering to complete a review of design compliance etc. over and above the value of the report, which we valued at [redacted].

4	Please confirm that the desktop review of buried services across the 8 sites is the figure [redacted] (MDL-38)	We had previously included the buried services review within the T&M portion. This is now included within the MDL-38 survey fee within 'tfl_scp_002389_Mott_MacDonald_Financial_Submission_B_v2'.
5	TfL requires a cost for MDL-38 onsite intrusive (as per the scope in MDL-38) ground investigation surveys across the 8 sites. Are you able to confirm what this cost is?	The price against MDL-38 now covers for on-site ground investigation surveys across all 8 sites. Please note our proposal for a cost saving within Section 8 of 'tfl_scp_002389_Mott_MacDonald_Financial_Submission_B_v2'. In addition to responses to questions 4 and 5, please note our one additional assumption and two revised assumptions within 'tfl_scp_002389_Mott_MacDonald_Quality_Submission_A_v2'.
6	Please confirm your survey costs MDL33-39 cover all 8 substations and are not priced per site	Yes, all survey costs are inclusive of 8 substations. Traction Power and Civils team expect to do 2 sites per day.
7	MDL 19 and MDL 20 do not have an estimate. Please can you explain the reason for this.	Non-Compliance Report (NCR) - MDL 19 - priced within the dilapidation survey MDL 33Master Records Register (Trams records) Request - MDL 20 - price included for within engineering design work

8	MDL-020 Master Records Register (Trams records) is produced but not identified using MDL code. Please can you confirm that activity ID TRRS_PUP_GET_1100 represents this	Yes, TRRS_PUP_GET_1100 = MDL-020
9	The rates are higher than the Maximum Framework can you please confirm that they can be amended to the Framework rates and also supply one rate per grade.	Rates have now all been amended to Lot A rates as a maximum We only have one rate per grade within each discipline Our DSF grading is now consistent with Therapia Lane
10	Please can you confirm if Paula Lovell (Project Manager) will be a fully dedicated resource to this commission on a full-time basis because the tender response said "wholly dedicated"	She won't be full time on the project as we do not believe this is required. The term 'wholly' was meant from a quality perspective rather than a quantitative perspective. Apologies for the confusing terminology.
11	Sandeep Patel's proposed framework grade is Director, although he has previously been classified as a Principal Consultant. Please could you provide detailed justification for	As above, we've amended him to a Principal consultant. Thank you for pointing this inconsistency out.

	the proposed change in pay grade for this commission?	
12	The majority of the proposed resources are designated with the Director grade which seems excessive for this Commission. Kindly review and explain reasoning for paygrades assigned to each resource and explain how they are applicable to the project deliverables.	The proportion of director grades in our PUP team is commensurate with our Therapia Lane project team. We believe this is necessary to ensure the quality of services TfL expect from Mott MacDonald.
13	Please can you explain what DSF stands for? Some of the roles are still above framework maximum rates - have these been previously agreed with TfL Framework Managers? I may have further questions, but I will come back to you once I am back next week.	DSF was a typo, instead it should read 'PSFW2 94203 Lot A02'. We have been advised that the rates we have used are correct and have been agreed between Mott MacDonald and Shaheen Lodhi at TfL. The rates are the uplifted rates as per the second to last column in the deed of variation. Whilst checking the rates we did spot 2 anomalies where the rates weren't consistent across the discipline/grade, and these have been corrected in the v4 commercial submission attached. We would be happy to discuss any further queries over the phone next week if you wish to.

14	TfL would be grateful if you could please provide a level of effort schedule based on your proposed programme and team. We are keen to understand how you plan to allocate resources throughout the duration of the contract by illustrating the amount of hours each role and grade is expected to be allocated to each MDL with a description of their responsibilities. I appreciate this is a time-consuming task, but your response would be very much appreciated by close of Friday 9 August. TfL needs to conclude governance on this procurement; it is critical that the award does not slip. Thank you very much for your consideration and ongoing support.	Given the timescales involved, we are not able to produce a cost loaded programme. Instead, we are sharing a cash flow forecast based on a coarse, yet sensibly reasonable, distribution of costs against the proposed programme. We trust this is acceptable to TfL and help you address your requirements. We would be happy to produce a cost loaded programme once we have been selected preferred bidder. We will get back to you early next week with answers to the last few open comments on our assumptions.

	Mott MacDonald			
	Assumptions / Exclusions	**TfL Comments**	**MM Answers (12/08/24)**	**TfL Final Comments**
General	Mott MacDonald is not acting as / or appointing a Principal Contractor for this work. We will engage with a competent contractor to fulfil the requirements of ECI, and support constructability.	No - the relationship is between Mott MacDonald and their PC. TfL discharges its duty as PC and gives it to Colas but the appointment can only happen between Mott MacDonald and Colas because that is where the commercial relationship will lie.	Noted	
	Our offer is based on a mobilisation period of 4 weeks upon award of project.	The programme shows a mobilisation period of 5 days. Please confirm.	Please find attached revised program showing a 4-week mobilisation period. Note that the end date is unchanged. We will try to minimise the mobilisation period if possible.	Noted.
	Mott MacDonald's management team to mobilise prior to contract start date (if approved)to mitigate programme	Noted		
	Sufficient background information to complete the Concept Design is provided within one week of instruction by TfL. This includes items listed in Section 6.19 Information to be provided by TfL at Project Inception	Not CD - typo?	Noted. This is a typo. The assumption should refer to 'feasibility study' instead.	Noted.
	The main design team will be based in the UK and will work normal UK hours. The Works will be designed to British Standards and British codes of practice. Some of the work will be carried out by our Global Delivery Service in order to maximise value for money to our Client.	Noted		
	We have allowed for one iteration of each document (draft format) and a subsequent revision (final format) to capture a single set of combined comments by TfL.	Noted		
	Stakeholder engagement will be managed by TfL. MML's input will be limited, as outlined in Section 6.20 Schedule of Meetings	Noted		
	TfL will facilitate access to their own specialists as necessary to	Noted		

	respond to particular questions or queries.			
	We reserve the right to revisit our fee proposal should the proposed design programme change significantly for reasons outside our control	Noted		
	We understand the work will be carried out under permitted development rights and have excluded planning support	Noted		
	We will not apply for planning permission for any future extensions / upgrades to the substations – this will be actioned by TfL. We will have no liabilities for the length of time it takes for TfL to obtain planning permission for the Works	Noted		
	Given Colas Rail's ECI support, they will not be precluded from bidding the main construction project delivery	Noted		
	We will have no liabilities associated with Asbestos including surveys, identification, and removal	Noted		
	We will have no liabilities associated with Confined Spaces including entry to, surveys and identification.	Noted		
	We will have no liabilities associated with terrorism	Noted		
	Fire safety services are limited to review of existing fire detection and prevention facilities within the named substations, and a high level Substation Fire and Evacuation Strategy	Noted		
	Other external works such as landscaping, security strategy, external lighting, lighting mounted on the external façade etc. are excluded.	Security and external lighting should be included. Your offer includes provisions for security 1.3.1 (lighting is part of security) this will have a minor impact on the SPO and should be included at feasibility	Feasibility design of substation external lighting has been included in our price.	Noted.

	Our offer excludes any advice on asbestos, toxic mould, or radioactive contamination	Noted		
	TfL will provide Mott MacDonald with an asbestos condition survey report for the 8 substation sites and Therapia Lane Depot including confirmation that it is safe for MM staff to conduct non-intrusive surveys within the substation buildings.	Noted		
	TfL will provide Mott MacDonald with details of any confined spaces within the 8 substation sites and Therapia Lane Depot.	Noted		
	The cost of any third-party checks on engineering designs or third-party approvals is excluded, as is responding to any third-party review.	Noted		
	It is assumed that all third-party approvals such as local permissions and statutory approvals (including fire authorities) will be obtained by others with technical information provided by Mott MacDonald as required.	Noted		
	The production of any Impact Assessments for the Third-Party approval of any services, structures or infrastructure that may be affected by the proposed works is excluded.	Noted		
	Full and complete as-built documentation for any impacted infrastructure will be provided by TfL. Previous stages documentation will also be provided for our review	Appendix D of existing Tram Records to be provided to winning supplier	Noted	
	The scope is limited to a feasibility study and surveys to support the study	The scope is as stated in the tender documentation.	Noted	
	Scope is limited to the eight substations and multiple cables as identified within the ITT Technical Requirements	The scope is as stated in the tender documentation and is not limited to 8 substations and multiple cables.	Noted	

	Specification LR07.006 Revision 2.2 in Section 2			
	Any additional activities regarding enquiries and following up from stakeholders will be charged on an ad-hoc basis	Noted		
	Surveys to be undertaken during normal working hours. Safety critical staff will be provided	Noted		
	TfL will promptly deal with and provide any RAMS, permits, access requests, possessions etc to facilitate the surveys	Please clarify - the supplier should provide this	Clarification of assumption as follows: Mott MacDonald will provide site safety paperwork, access requests, etc. to TfL. We assume TfL will promptly review our submissions and promptly grant access, etc.	Noted.
	Rectification or design for the corrective action of existing non-conformities / non-compliances is excluded	Noted		
	No technical reports or technical drawings will be updated following the Value Engineering Exercise	Noted		
	Design programme has designs running in parallel to mitigate programme length and tied into one DRN review cycle. If, for reasons outside of Mott MacDonald's control, this is no longer the case, the programme (inc. logic between disciplines) will need to be updated	Noted		
	The TfL Review and Approve of Updated Cost Post the VE will only require one 25d review cycle – any further comments will require further review and update and extend the programme	Noted		
	Scope added or removed will require a change to the programme and may impact the end date	Noted		
	Non-compliances observed during planned sight surveys will be raised through our Safety Management Procedures, recorded, and advised to TfL on a regular basis.	Noted		

	Records provided by TfL for the London Tram infrastructure are a true and accurate record of the actual installation	Ok in so far as is reasonable	Noted	
	Access to the tram network and substations can be obtained for our programmed dates without hinderance, and within a reasonable timeframe	Noted		
	TfL will provide access to and liaison with the ongoing interface projects, such as the Tram Management System upgrade project	Noted		
	Our surveys will take place on TfL owned land and public areas only. We will advise you if access to third party land is required to complete the surveys and will expect TfL to arrange that at no cost to ourselves, if needed	Noted		
	TfL may require purchasing additional land as a consequence of the designs. Substation extensions / upgrades may be limited due to a number of factors. Additional cable management systems may be required	Noted		
	It is assumed there is space at Therapia Lane Depot for the substation module described in LR07.006 Revision 2.2	There is not a substation at the Depot. The supplier will assess space as per the requirements.	Assumption clarification as follows: It is assumed there is enough space at Therapia Lane Depot or in the vicinity of Therapia Lane substation for the future substation module described in LR07.006 Revision 2.2 and that alternative locations will not have to be sought.	Noted
	Existing equipment on site may not be compatible with new equipment.	Noted		
	We have received the TQ responses from TfL, which have informed our offer, and are adopted as part of the assumed information forming our scope of work and deliverables.	Noted		
	No additional deliverable documents over and above those	Noted		

	listed in these assumptions will be provided.			
	Those TfL, British and other standards in publication on the date of contract award shall be adopted for the duration of the project. If any standards are updated during the project, they will not be adopted unless instructed by TfL.	Noted		
	The feasibility designs will be in accordance with all normal typically applicable industry specific British, TfL, and London Tram standards.	Noted		
	A single IDC and IDR have been allowed for and will be held simultaneously on a single day.	Noted		
	Management of construction and on-site health and safety matters are the responsibility of others.	No. The design will take into account constructability and maintainability throughout its lifecycle.	Clarification of assumption as follows: Management of construction and on-site health and safety matters during construction are the responsibility of others. Mott MacDonald will take into account constructability and maintainability in our design only.	Noted.
	CCTV surveys for drainage can be provided upon on request via variation. These would be targeted at specific sites of concern to minimise costs.	Noted		
Traction Power	Traction power scope is limited to 8 substations upgrade options feasibility study, positive feeder reinforcements options feasibility study, DC Protection assessment and related drawings as per Technical Requirements Specification LR07.006 Revision 2.2.	The scope is as stated in the tender documentation.	Noted	
	TfL will not change the assumptions listed within Section 5.1 of Technical Requirements Specification LR07.006 Revision 2.2 during the project, and these form the final inputs to the scope of work.	Noted		
	No further modelling is required. TfL will provide any additional	Noted		

	necessary inputs if required that has not been provided in tender documentation.			
	The traction power design will be based on desktop and non-intrusive visual inspection site surveys and inputs from TfL and other disciplines.	Noted		
	Mott MacDonald will utilise previously completed work for TfL to aid the design for this project, as recorded in Mott MacDonald, London Trams 2030 Strategy, Simulation Study Final Report, 28 July 2017, Rev C. Reference 329354/REL/TP/01/A, as baseline information.	Noted		
	Any land purchase, temporary access agreements or wider consents required are obtained by others and secured in advance of any construction commencing on site.	Noted		
	HV design upstream of the listed substation sites is excluded. TfL will undertake any DNO load applications for increased HV power supply capacity required to implement the Power Upgrade Project.	Noted		
	Temporary works are excluded from scope.	Noted		
	The substation feasibility study will cover the high-level objectives for each substation as set out in Section 2.3, Tables 3 and 4 in LR07.006 Revision 2.2. No other traction power designs will be reviewed / assessed. Mott MacDonald do not take any responsibility for the high-level objectives set out in Tables 3 and 4, these have been designed and supplied by TfL.	Includes Section 2.4 also. The scope is as per section 2	Noted. This is a typo and should read Sections 2.3 and 2.4.	Noted
	Positive feeder reinforcements options feasibility study will cover the locations as set out in Section 2.2.1, Tables 1 and 2 in	Includes Section 2.4 also. The scope is as per section 2	Noted. This is a typo and should read Sections 2.3 and 2.4.	Noted

	LR07.006 Revision 2.2. No other locations will be reviewed / assessed. Mott MacDonald do not take any responsibility for the locations of positive reinforcement set out in Tables 1 and 2, these have been designed and supplied by TfL.			
	The DC Protection Assessment Calculations and Proposed upgrades are limited to the DC circuit breakers located in the seven route substations listed in LR07.006 Revision 2.2. For Therapia Lane the DC Protection Assessment Calculations exclude Depot track feeder circuit breakers 12 DCF DW and 12 DCF DE.	Noted. The scope is as per Section 2	Noted.	
	We cannot confirm that your design will retain the current level of service capacity across the existing network.	Noted		
	Only new areas of the extended / upgraded substations will be provided with future proofing space.	Noted		
EMC	No EMC-specific deliverables required (none included in MDL). EMC input limited to participation in multi-disciplinary activities and contribution to related deliverables, with the objective of ensuring EMC-related hazards are identified and recorded for future management and EMC is considered during the design process, taking cognisance of requirement TRRSP-PUP-1883 in Technical Requirements Specification LR07.006 Revision 2.2.	Noted		
Civils & Utilities	There are utility services (water, electricity, and drainage by gravity) of sufficient capacity within 5m of the construction site boundary into which we are permitted to connect.	Part of this commission's design process	Noted	

	No gas supplies required for the substations.	Noted		
	Preparation of a Drainage Strategy and Flood Risk Assessment including consultation and approval of such documents with the Lead Local Flood Authorities (LLFA) is excluded.	Noted		
	Where an unavoidable impact on a buried utility is demonstrated, we will provide TfL with such details of the utility as we have available and the relevant contact details of the Utility Owner. Further advice or managing this on behalf of TfL is excluded unless agreed otherwise during contract.	Noted		
	GRP/CAT scans will included as part of the non-intrusive GI surveys. Record data of utilities will be obtained and assessed ahead of surveys.	Noted		
	~~No CAT scans or any other form of buried utility location will be undertaken. Only record data will be obtained and assessed.~~	Replaced by assumption above.	This assumption can be deleted.	Noted.
	A single-phase design and construction programme is assumed. The timescale to prepare deliverables will be in line with the agreed programme between Mott MacDonald and TfL.	Noted		
	Planning permission, if required for the substation upgrades, will be obtained within 6 months of application and prior to a detailed design and build tender being sought. This will be actioned by Others.	Noted		
	Our deliverables are based on the completed final scheme and do not include for a phased design approach.	Noted		
Structures	~~Maximum 50% of sites anticipated to require a site visit~~	At Mott MacDonald's risk	This assumption can be deleted.	Noted.

	~~to review geometry constraints following up from initial survey by others.~~			
	Max 25% of sites anticipated to require new structural interventions to accommodate increased weight / size of equipment.	The sites are of a similar design therefore TfL anticipates that all or none need a structural intervention	Noted	
	Our structures deliverables exclude the production of: a) A Generic Quantitative Risk Assessment (GQRA), b) Detailed Quantitative Risk Assessment (DQRA), c) Material Management Plan (MMP), d) Remediation Strategy Report, and Verification Report. e) the production of a GDR.	Noted assuming a qualitative RAs are provided	The high level desk studies will initially assess the contamination risk and if a qualitative risk assessment is required, this will be flagged.	Noted that this relates to the same Geotechnical assumption.
Geotechnical	Once through assessment of each site on a desktop study.	Please clarify?	This is to reflect that for each geotechnical / geoenvironmental deliverable there will be a once through assessment, i.e. each site is assessed once only.	Noted. Residual risk sits with MM if their initial assessment is defective.
	Assumes Archaeological constraints for this site are already known or will be assessed by Others.	Unknown but risk is low. Extensions will be adjacent to existing substations.	Archaeological review can be varied into the scope if required.	Noted.
	It is assumed that access to site is arranged by the Client, or the Client's representative.	Noted		
	Excludes any advice on asbestos, toxic mould or radioactive contamination, a specialist will need to be employed to provide advice on these should they be found to be a risk to the project.	Noted		
	Assumes that any existing reports available for these sites are provided by the Client at the commencement of works, and are warranted to the Client.	Noted		
	Only a high-level desk study has been allowed for that will be based on open source information. A detailed desk study may be required, dependant upon	Noted. Can MM state why it is appropriate to take this approach?	Based on the proposed works, site location and likely ground related risks this is seen as a suitable approach. This offers a more streamlined approach, value for	Noted. It is assumed the desk study will be completed prior to attending site.

	the findings of this initial assessment.		money and it is only anticipated that a detailed desk study would be required if significant ground related risks were identified during the production of this deliverable. Please note that our methodology also includes non-intrusive ground investigations.	
	Excludes the production of a GQRA, DQRA, MMP, Remediation Strategy Report, and Verification Report. These can be priced for if required.	Noted		
	Excludes the production of a GI Specification. If required after the completion of the high-level desk study, this can be priced for.	This should be an output of the CAT scans.	At this stage, intrusive GI has not been allowed for. If this is found to be necessary, a GI Specification will be produced.	Noted.
	Non-intrusive GI (GPR/CAT scans or similar) are included. Soil resistivity tests and any intrusive tests that may by required as a result of inconclusive non intrusive surveys will be identified and provided via a variation if required.	Noted		
	Excludes non-intrusive and intrusive GI costs, these services can be provided via variation if required.	Noted		
	No geotechnical design has been allowed for. This can be priced for if required.	Noted		
	Temporary works design is excluded.	Noted		
	Excludes the production of any other geotechnical reports; for example GIR or GDR.	Noted unless quoted for via variation as above.		
	No assessment of UXO risk has been allowed, other than a review of regional risk. It may be that further assessment is required prior to the commencement of works.	Noted		
	Excludes any interaction with any statutory bodies or regional / local authorities e.g. the Environment Agency.	Noted		

Overhead Catenary Systems	Design work for overhead catenary systems (OCS) is limited to feasibility level designs for any new or modified power cable connections resulting from the listed substation upgrades / extensions and positive cable reinforcements. Provision of revised OCS designs for any other reason is excluded.	Noted		
LV Power / Mechanical	Access to LV equipment and assets to be provided by Others. Surveys will be nonintrusive and limited to visual inspection of existing equipment.	Noted, however, non-intrusive works includes the reporting on cabinets, covers, cupboards that need to be opened (could be opened by others if required).	Noted	
	Works such as external lighting, lighting mounted on the external façade etc. are excluded. Works are limited to internal building services.	See answer (Security and external lighting should be included. Your offer includes provisions for security 1.3.1 (lighting is part of security) this will have a minor impact on the SPO and should be included at feasibility)	Feasibility design of substation external lighting has been included in our price.	Noted.
	Mechanical building services such as heating and ventilation are excluded.	Agreed no design needed at this stage but high-level provision in the LV load estimation should be made as part of requirement TRRSP-PUP-2015.	We confirm this is included.	Noted.
	As-Built drawings and detailed specifications for existing equipment in substations will be provided.	Noted		
	Electricity usage records can be made available by TfL for each of the 8 substations.	Noted		
Telecoms & SCADA	SCADA and telecoms requirements to be like for-like to match existing, overcoming obsolescence and replacement of legacy systems.	Noted		
	The technical scope is limited to: a) SCADA for traction power, out-stations, and master-station. b) CCTV for substations. c) Intrusion detection for substations.	The scope is as stated in the tender documentation.	Noted	

	d) Telecoms transmission from substation to depot.			
	SCADA and telecoms feasibility study to be based on preferred traction power, OCS feasibility option (also encompassing operations and safety requirements).	Noted		
	The SCADA upgrade will be based on replacement of the now obsolete Syseca RTU including the head end equipment.	Noted		
	Telecoms and SCADA input to the Feasibility Report will be limited to: a) Summary of existing infrastructure (high level only). b) Summary of requirements for upgrade (captured from stakeholders). c) Commentary on feasibility of SCADA and telecoms upgrades. d) Commentary and sketch of outline design for pricing purposes.	Noted		
	Existing SCADA head-end has sufficient capacity to interface with new RTU equipment.	Noted		
	Existing CER and OCC are sufficient in size, space, and have MEP provisions.	Noted; acceptable for feasibility	Noted	
	All head-end works (including updates, configuration etc) shall be undertaken by the existing system maintainer	Please clarify what this means.	It is assumed that the existing SCADA system has sufficient capacity to interface with the new RTUs. If any upgrades or re-configuration of the existing SCADA system are necessary, they should be carried out by the current SCADA system maintainer.	Noted.
	Upgrade of the head-end equipment in the CER/SCADA Control is excluded.	Please clarify what this means.	It is assumed that the existing SCADA system has sufficient capacity to interface with the new RTUs. If any upgrades or re-configuration of the existing SCADA system are necessary, they should be	Noted.

			carried out by the current SCADA system maintainer.	
	Any CER and OCC redesign is excluded.	Please clarify what this means.	It is assumed that the existing SCADA system has sufficient capacity to interface with the new RTUs. If any upgrades or re-configuration of the existing SCADA system are necessary, they should be carried out by the current SCADA system maintainer.	Noted.
	Access to Telecoms cabinet and substation telecom's locations to be arranged by others.	Noted		
Environment	We will endeavour to prevent and reduce impacts to buried archaeology, however, we cannot ensure no impact to buried archaeology.	Noted		
	Carbon inputs will be qualitative only, should quantitative inputs be required, a scope change would need to be agreed.	Noted		
	BNG inputs include a feasibility assessment report only. A BNG design stage report is excluded.	Noted		
	BNG will only assess land within the red line boundary.	Noted		
	There is no allowance for off-site baseline surveys.	Noted		
	The environmental inputs do not include a BNG habitat and monitoring plan.	Noted		
	One environmental evaluation and report will cover all eight sites including all cable routes listed in the TRS.	Noted		
	~~Assumed no Carbon Management Plan needed.~~	This is a mandatory requirement MDL-029	This assumption can be deleted.	Noted.
	Assumed qualitative assessment for selection of the SPO's for each site.	Noted		
	Allowance has been made for desktop searches only and no site surveys.	Noted		
	Two half-day Hazard identification workshops will be	Noted		

	held via teleconference (virtual workshop) at Feasibility stage.			
	CSM-RA will be applied as best practice.	Noted		
	The employer will ensure attendance from stakeholders to the hazard identification workshops. Delays receiving completed SQEP Forms will delay the issue of the Workshop Report.	Noted		
	The employer will identify and invite the relevant SQEP attendees/stakeholders to the HAZID Workshop and ensure their participation.	Noted		
	Hazards identified in the workshops will be captured within a CSM-RA compliant Hazard Log (MS Excel file).	Noted		
System Assurance	At this stage of the project, it is anticipated that no evidence collection and no development of safety requirements will take place due to project maturity.	The safety requirements will be required for the move from feasibility to concept design stages.	Noted. Based on previous experience on similar projects it has been found that the safety measures identified are high-level in nature and may not lead to a specific safety requirement. The team will certainly apply a pragmatic approach and where possible will capture the safety requirements.	Noted.
	Briefing Note will be produced for the Hazard Identification Workshops at Feasibility stage which will cover the scope of the project at this stage. The Briefing Note will include the following: (i) SQEP form, (ii) Attendance sheet.	Noted		
	The workshop will be used to capture and identify Hazards for the project from a (i) Functional, (ii) Interface and (iii) Operational and Maintenance perspective.	Noted		
	A SQEP Form will be issued prior to the workshop at Feasibility stage. It is assumed that the employer will ensure attendance from stakeholders is complete and forms are returned. Delays	Noted		

	receiving completed SQEP Forms will delay the issue of the Workshop Report.			
	The Project Stakeholders are expected to provide all relevant evidence that the requirements have been implemented.	TfL is the acceptor of assurance that the requirements have been implemented.	Noted	
	Mott MacDonald will issue consolidated V&V Matrix extracts to the relevant stakeholders for action.	Noted		
	It is assumed that the stakeholders will return the completed V&V Matrix extracts with the required completed fields.	Noted unless stakeholders require clarification	Noted	
	It is assumed that only one consolidated V&V Matrix extract per stakeholder will be issued and received.	Noted		
	Any additional activities regarding enquiring and following up stakeholders will be charged on an adhoc basis.	Noted		
Fire Engineering	The deliverables are based on the SPO's and do not include for a phased design approach.	Noted		
	Any risk assessments to prove compliance with standards are excluded.	If this impacts the SPO, it needs to be included.	MM are basing the design on British and TfL standards, ensuring that the solution is suitable and accepted by the end user. Any requirement for additional risk assessments or engineered solutions are not yet known and cannot be accounted for at this time.	Noted.
	Mott MacDonald do not certify any fire safety systems.	Noted		
	The fire and evacuation strategy will be very high level due to the early stage of the project.	Noted		
	The Fire Engineering team will review the existing Fire and evacuation strategies and other records for the 8 substsations.	Noted		
	Any increase in the scope or required work will incur additional cost.	Noted		

	Any additional activities regarding enquiring and following up stakeholders will be charged on an ad-hoc basis.	Noted		
	Site visits have been excluded.	Noted		
BIM	TfL will host the CDE, set up the CDE and have workflows etc. in place ready to go from Contract Award. Mott MacDonald will not host the CDE.	Noted		
	We have assumed that TfL have experience using ProjectWise.	Yes		
	We have allowed for a LOD200 Level of Detail with 2D and 3D modelling.	Noted		
	A co-ordinate system will be provided by TfL prior to commencement of work / surveys.	Noted		
	Asite will be utilised for Contract Management and TfL will provide access to the system for Mott MacDonald.	Noted		
Site Safety	Site safety staff will be provided as required for each on site survey, as set out in the Network Rules.	Noted		
	Mott MacDonald and Colas Rail staff will have completed all their respective in-house mandatory safety training, and will complete LT Track Safety Awareness as required by the Network Rules / survey area.	Noted		
	LT Substation Maintenance staff will be provided at no cost to the project by TfL for the substation surveys to provide safe access and to open / close equipment doors (SCADA cabinets, LV MCB boards) and lift / replace cable route covers etc.) for Mott MacDonald and Colas Rail staff.	Noted		
Cost Estimating	The capital cost estimate for direct works will include equipment manufacture, supply, and installation, with associated civils and enabling works.	Noted		

	Capital costs for direct construction works will be undertaken as a 'top down' estimating approach using proprietary Mott MacDonald cost data and open-source cost data (where appropriate) based upon parametric models.	Noted		
	The estimate will be baselined at the point of completion. Forward escalation of estimated costs will be excluded.	Please clarify what forward escalation is	This is referring to the base date of the estimate. The forward escalation is the inflation uplift to adjust to mid point of construction using published indices e.g RPI. If needed, we can include in the estimate as long as mid point of construction is provided at no additional costs.	Noted.
	Estimate accuracy is to be in accordance with the Association of the Advancement of Cost Engineering (AACE) 18R-97 Cost Estimate Classification, Class 5 within the accuracy range of -50% to +100% for estimated costs, aligned with the anticipated maturity level of project definition deliverables. It should be noted that this range is applied to the costed scope and does not consider significant scope changes, post design stage.	Noted		
	As a full Detailed Design is not expected to be available, where possible, in the estimation of particular scope areas, it will be endeavoured to provide greater cost certainty by providing a lower classification of estimate per section, where design definition and project data allows (albeit that the overall estimate classification is anticipated to remain at Class 5).	Noted		
	Indirect costs which will include scheme design, construction contractor's preliminaries, temporary works, contractor's risk, overheads, and profit, will be	Noted		

	assessed as typical percentages of capital cost estimates.			
	Optimism Bias will be considered, and applied to the estimate, as recommended by the UK IPA (Infrastructure Projects Authority) guidance on cost estimating best practice.	Noted		
	~~Measured works (BoQ) containing direct works element quantities will be provided by others in excel workbook format in preparation for estimate production.~~	Who are the others; Colas?	Please delete this assumption.	Noted.
	The estimate will be submitted in an excel workbook format.	Noted		
	Operational and Maintenance (Opex) costs over a pre-determined time period, which will be assessed using historic cost data for existing facilities, alongside averages and norms as required to fill gaps.	Noted		
	Only the Single Preferred Option for each site will be costed in full. Rough Order of Magnitude costs will be used for option selection.	Noted		
	Assessment of scheme design costs, client costs and third-party costs are excluded.	What are scheme design costs?	Scheme design costs are associated with developing the design as the scheme progress through the project lifecycle. This element will be a combination of sunk costs (provided by others) and forecast to completion. If detailed design, this information is typically provided by others for inclusion in the estimate.	Noted.
	No allowance will be made for cost assessment for modification of existing system.	Noted		
	It is assumed that the TfL style Cost Plan Report is not required.	TBC	Noted	
CDM	We have included for undertaking the duties of the Principal Designer (PD) as set out in Part 3 of the Construction (Design and Management) Regulations 2015	Noted		

	(CDM Regulations). We would expect this would be formally confirmed under separate cover.			
	No allowance made for Principal Designer support to Ground Investigation surveys (assumed to take place in the next phase).	GPR and CAT scan support is allowed for.	The Principal Designer will help set the scope for the non-intrusive ground investigations to be undertaken by the Principal Contractor, i.e. the PD has allowed for support on GPR and CAT scans. If intrusive ground investigations are required at a later stage, those would need to be instructed and the PD/PC would work together to deliver them.	Noted.
	Principal Designer Building Safety Act is excluded	As long as Mott MacDonald is confident that is does not apply.	We have not priced for a Mott MacDonald Principal Designer Building Control Officer to review and sign off the design against the Building Control Regulations to Gate 1.	Noted.
PC	Mott MacDonald have included for Colas Rail to undertake the duties of the Principal Contractor (PC) as set out in the Construction (Design and Management) Regulations 2015 (CDM Regulations). We would expect this would be formally confirmed under separate cover directly to Colas Rail and copied to Mott MacDonald.	Please see response to first assumption.	Noted	

Information to be provided by TfL	• SCADA & CCTV Information. • Information Received from Existing Renewals Projects. • Receipt of Existing Weights & As-Built Information • Maximum DC Traction Currents & Fault Current Information, existing DC protection settings. • Existing Buried Services / Utilities Information. • Latest Environmental Evaluation & Corporate Plan. • Access / Possession Planning Rules for Each Site / Location. • Master Records Register (TRAMS Records) Request. • All CAD Copies of Existing Drawings Delivered to MML. • Records of Oil Sampling and Partial Discharge Testing. • Relevant information about the project for the production of the Engineering Safety Management Plan, Systems Engineering Management Plan, and Preliminary System Definition. • Substation fire plans. • Relevant as built records of traction power assets under current scope will be provided in CAD format prior to commencement of design works. • Information on the present EMI emissions of the London Trams system and its neighbours. • Asbestos records for the project listed substations and Therapia Lane Depot. • Confined space information project listed substations and Therapia Lane Depot. • Any other available information not listed above, which may be used in delivering our work.	Please clarify what TRAMS means in this context. Where CAD copies of existing drawings are not available, non-CAD versions will be provided.	TRAMS (should read ‘Trams’) = London Trams The rest of TfL comment is noted.	Noted.

1. Methodology

1.1 Our 'one team' approach

We believe in a *One Team* approach, working closely with our Early Contractor Involvement team from Day 1, collaborating with Transport for London (TfL), London Trams (LT), Tram Operations Limited (TOL) and other Stakeholders to make sure the project's overall and key objectives are successfully delivered.

We will actively engage with you on a regular basis, which will allow us to identify issues early and manage inevitable changes, conflicts, and competing priorities.

Given our locality, with offices in both Croydon and central London, we propose in person formal meetings on a monthly basis and weekly progress meetings via MS Teams with a flexible agenda and attendance suited to each stage of the project.

We will adopt TfL's common data environment (CDE) to enable efficient information sharing and the creation of a single version of the truth. We use MS SharePoint and ProjectWise to store and share information. We note the use of TfL's Asite for contract management and will discuss project IT set-up with you further on appointment.

1.2 Understanding of TfL requirements

Our Mott MacDonald team will have a clear understanding of your requirements having carried out several previous works on London Tram, in particular the 2030 traction power modelling, Therapia Lane depot and London Trams Replacement Rolling Stock 2030 Strategy. Our understanding has been developed through a history of working with you on various projects over the last 25 years.

Our combined Mott MacDonald + Colas Rail team will hold an inception meeting with you as soon as practical after appointment. In this meeting, we will clarify our understanding of your aspirations for the commission as governed by the Technical Requirements Specification, table a draft Validation and Verification requirements matrix and address any remaining contractual points. The requirements matrix will remain a live document and form the basis of our integrated design solution.

We will review the existing design details and other background information to understand TfL's overall design intent, the existing systems, site constraints and other vital substation upgrade requirements including suitability for extension, space for additional assets, structural, topographical, and environmental factors, the ability to carry out safe isolations in the future modified / new substations, road access requirements and compliance to fire standards.

Support from Colas Rail throughout the programme will enable the whole project team to develop design solutions to suit the construction logistics associated with working in a live tramway environment and maintain service levels where possible.

1.3 Design and Survey Strategy

When developing the draft programme for this project, we have adopted a motto of "Detailed planning, fast execution".

1.3.1 Stage 1

During Stage 1, while the engineering teams are reviewing the relevant records for London Trams received from TfL, our traction power specialists will plan the footprint plus internal layouts focused on safety and operational space requirements needed for each substation extension listed in the Technical Requirements Specification, to provide minimum spatial and mass requirements to our Civils and Structural specialists.

Design team meetings will be held regularly, where the engineers will discuss what they have learnt, brainstorm out preliminary ideas for the substation extensions / additions and identify their priority items for survey. This will enable us to eliminate the less feasible / practicable ideas from the get-go and also identify any particularly problematic sites.

The periodic meetings with TfL during Stage 1 will be used to develop and agree the assessment criteria for the options.

The conclusion of Stage 1 will be a robust set of initial options for the works. All the designs will draw on the advice from our multidisciplinary integrated teams. This includes input from overhead catenary systems (OCS), telecommunications, traction power, SCADA, fire, environment, sustainability, and others. Principles of lean and sustainable design will be followed to rationalise carbon footprint, cost and potential impact on stakeholders and the environment for the alterations (extended / upgraded substations) to the permanent scenario.

Security and operational philosophy of the new buildings will be discussed with TfL and specialists to inform the architectural design to avoid security infringement risks and dead spaces. We will evaluate whether changes to the CCTV system are needed to maintain and improve coverage.

1.3.2 Stage 2

The Traction and Civils teams will carry out the main survey of all 8 substations and the positive parallel feeder cable routes in partnership, this will include taking photos and videos plus recording substation internal dimensions.

A second survey team consisting of SCADA, LV, Structures and Constructability will carry out a support services survey of all 8 substations. This will include taking photos and videos.

A topographical survey by Colas Rail will provide information on exterior dimensions.

Desktop surveys of TRU manufacturers data, Geotechnical and Ecology will be completed to provide a holistic set of information. Where necessary and where high-risk sites are identified as a consequence of the Geotechnical desk study, through a variation, site based non-intrusive (i.e. no drilling) innovative GI techniques will be deployed to obtain additional data on the presence of buried services and ground condition / stability (to ensure stability and safety of new modules near the upgraded substations). Those non-intrusive GI techniques have been trialled by Colas Rail over 2 years and successfully deployed in the UK on the West Midlands Metro. They will offer substantial cost savings to TfL and eliminate the risk of drilling into buried services, thus lowering project risk. If required (i.e. if existing earthing systems need reinforcing), through a variation, soil resistivity measurements will be undertaken.

Information from the site and desktop surveys will then be used to complete:

- Asset Condition assessment / Dilapidation survey,
- Exterior and Interior Dimensions comparison to records,
- Assessment of Space Constraints for TRU installation and
- SCADA System Capacity.

The survey information, along with optioneering workshops, rough order of magnitude constructability and feasibility work will be used to enable selection of a Single Preferred Option (SPO) for each substation / positive parallel cable reinforcement. The SPO's will be taken forward into Stage 3.

1.3.3 Stage 3

The ECI will carry out value engineering, including co-hosting workshops to improve the affordability of the project. The Estimators will refine and finalise the cost estimate for the SPO's and this will reflect the developed final value-engineered design.

1.4 Option Selection, Workshops and Deliverables

TfL will be kept appraised of the design progress through updates at periodic meetings, production of the short-listed options for each site will be followed by two Option Selection Workshops, from which the Single Preferred Option for each site will be selected. Once the single preferred options are selected, our team will output the Single Preferred Option Feasibility report.

In Stage 3, the Mott MacDonald and Colas Rail team will hold two Constructability Methodology Workshops, with collaborative input from yourselves and any required project stakeholders. Drawings, diagrams, and photographs will be used during the workshops to illustrate the designs and provide site visuals. The output of the workshops will be incorporated into the Constructability and Logistics Plan.

Cost estimating will follow on from the selection of the Single Preferred Options, leading to production of the Estimate report for your review. The feasibility estimate for the delivery of the works will be produced using metrics and benchmark pricing from previous traction power upgrade projects and construction industry standards. The feasibility estimate will be supported by the Project Risk and Opportunities Register and recommend the level of 'Risk' to be included in the estimate for construction works.

A Value Engineering workshop, attended by all relevant parties including Colas Rail and project stakeholders will allow a review to invite scope and design challenges and identify potential efficiencies and innovations to improve constructability, affordability and will include maintainability with the requirements of the operator in mind. The cost estimates will be updated following the value engineering workshop.

With the completion of the value engineering workshop, the Value Engineering report will be delivered. Once the Value Engineering report is delivered, all remaining live deliverables (items that are regularly reviewed and updated throughout the life of the project) will be finalised and issued for review by TfL, these documents would include items such as the Design Risk Assessment, Assumptions Log and Verification and Validation Matrix.

1.5 Managing Requirements

From our experience of similar projects, we will avoid conflicts through:

Collaboration Encouraging open communication and collaboration between all parties to foster an environment that promotes knowledge sharing and identifies constraints to inform decisions.
Early warning: Although it is uncertain when project priority conflicts may occur, we will maintain effective communication and good project planning to resolve them. Regular engagement between the whole team will enable the early identification of current and future issues.
Solutions rather than problems: Early identification of any issue is crucial but in the case that an unpredicted problem arises we will adopt a solution-focused approach. The way we operate is not to simply flag a problem but to assist in reaching a joint solution.

Where conflict resolutions cannot be achieved, we will discuss the pros and cons of the conflicting requirements and a

recommended way forward for your consideration.

1.6 Systems Safety

Mott MacDonald's Systems Engineering and Safety team first activity, starting at contract kick-off, will be to develop and share the Engineering Safety Management Plan (ESMP) and Systems Engineering Management Plan (SEMP) so that the project team can adopt a shared approach as soon as possible. The ESMP and SEMP will be commensurate to the early stage of the project and the complexity of the proposed changes, following CSM-RA principles and other relevant legislation.

The Systems Engineering and Safety team will lead two Hazard Identification workshops with TfL and relevant stakeholders. Regular reviews of the hazards and risks will also take place with the project team, with continual update of the Designer Risk Assessment and hazard log ongoing through the life of the project. These documents will be used to develop the designs and considered during the Single Preferred Option Selection, Constructability and Value Engineering workshops, ultimately leading to defined safety requirements that must be complied with or mitigated as reasonably as practicable.

1.7 Environment and Sustainability

Mott MacDonald's commitment to developing effective and sustainable solutions will be driven through innovation and industry best practices, covering areas from minimising our impact on the mature site boundary trees located close to the proposed buildings; reducing embodied carbon in the design, incorporating green infrastructure or the way the modified substation buildings are powered and heated.

Our appointed Environmental engineers will work with the whole team to identify lean design principles to benefit the project and the environment. They will lead the team in adopting TfL's Corporate Environmental Plan and its five key themes: sustainable resources, green infrastructure, climate emergency, air quality and best environmental practice. Our environmental team are very keen to implement Biodiversity Net Gain wherever possible and drive the Infrastructure Carbon Review principles of Build Nothing, Build Less, Build Clever and Build Efficiently into all decision-making processes.

1.8 Governance and Programme Management Processes

STEP is our fully integrated Business Management System (BMS), covering every aspect of our business. It is a common way of working, including standard processes that are followed by our staff, providing guidance, tools and support to ensure 'right first time' delivery.

It outlines how we manage and deliver projects to the highest standards of wellbeing, health, safety, security and ethics, helping us deliver economic, social, and environmental benefits.

STEP makes us more efficient, allowing us to focus on providing you with a consistently high-quality service and on adding value within the Power Upgrade Project.

The Assumptions and Requirements Register will be fixed and agreed early in the project to enable focus on technical solutions.

As part of our methodology, the following three live documents will be maintained for the duration of the project:

- A Project Risk and Opportunities Register in consultation with TfL.

- A Designers' Decision Log (Assumptions Log)
- A Designer Hazard Elimination and Management Record (DHEMR) (Designer Risk Assessment)

1.9 Management of Design Assumptions and Residual Risks

A Designers' Decision Log (Assumptions Log) and a Project Risk and Opportunities Register will be created early on in Stage 1 of the project. As described above, both documents will be maintained as live documents for the duration of the project with periodic reviews to be held on Microsoft Teams as required by clause TRRSP-PUP-1826 in the Technical Requirements Specification. At these periodic meetings during this commission and as the design develops, status of the assumptions and residual risks / opportunities will be reported to TfL with any changes agreed between all parties to maintain collaborative working. Both registers will contain clear closure actions and target dates for closing. Any assumptions and residual risks / opportunities that cannot be closed during Stage 1 or Stage 2 will be handed over at the completion of the feasibility work and ECI study, subject to agreement with TfL. Where feasible any open assumptions and residual risks / opportunities will be specified in the design documentation and / or Verification and Validation Matrix to allow requirement definition for future stages. Assumptions and residual risks / opportunities that can be closed either resulting from surveys undertaken or through design development will be recorded as such on the relevant register to ensure an audit trail of decisions made.

7. Risk Register

Mott MacDonald is committed to using risk management to safeguard its staff and assets, as well as those of its clients. We aim to manage risk and opportunities, and to continually improve our controls and processes.

At the project inception meeting, we will discuss and agree our approach to project risks and opportunities. A Project Risk and Opportunities Register is produced by Mott MacDonald and Colas Rail, which will be monitored throughout the programme lifecycle. Our register with proposed ownership and scope of mitigations against known areas of uncertainty will then be discussed at the relevant progress meetings.

Many projects are identified as 'over budget' when construction costs are developed against completed Concept Designs leading to Clients having to consider Value Engineering options that, invariably, lead to reductions in scope to make sure that projects are affordable. In some cases, projects are cancelled as construction costs make them 'unaffordable'. The need to undertake Value Engineering to drive affordable projects at later stages has a cost and imports delays into project delivery programmes. Through engagement with Colas Rail early in the Feasibility Study and their integration into the project team, we will proactively generate benefits to the project based on our construction and delivery knowledge, experience and expertise in driving 'best value' for TfL.

Colas Rail believe that 'best value' equals 'affordability' and are experienced in delivering 'minimum viable product' projects for clients, as our Mott MacDonald Team is too, through our recent early-stage feasibility work on Northern Powerhouse Rail. We are able to collaboratively challenge our clients' 'needs' and 'wants', which is essential to drive 'best value.'

We recognise that earlier and greater ECI during the Feasibility stage incurs greater costs. However, we believe that there is a direct correlation between successful project delivery and risk management to time and cost when construction issues are raised, mitigated and resolved during the project development and design phases.

Our high-level Risk Register is presented overleaf.

The key risks identified at this stage include:

- Delays to obtaining site access or approvals for site safety documentation impacting the survey programme,
- Changes to the proposed new fleet size or TfL's modelling assumptions leading to a change in the requirements for each site or change of site to be upgraded,
- Future increases in building material costs due to unforeseen global events,
- Unknown buried services information which may require diversionary works with associated budget and overall project programme implications.

Mott MacDonald shall not be responsible or held liable for any of the risks identified or reasonably implied and TfL shall make their own assessment of the risks outlined therein.

Project Name:		TfL London Trams Power Upgrade Project (Feasibility and ECI)	**Owner**	Mott MacDonald Project Manager											
Rev/Date:		Rev: P02, Date: 09/07/2024	**Development Manager**	TBC											
							Gross Risk Score						**Net risk Score**		
		Risk Details								**Risk Response**					
Risk ID	**Category**	**Risk description (Event)**	**Effect**	**Time (weeks)**	**Cost (£k)**	**Owner (accountable)**	**Current Probability (1 to 5)**	**Current Impact (1 to 5)**	**Current Score**	**Action Due date**	**Mitigation (Action and/or control)**		**Current Probability (1 to 5)**	**Current Impact (1 to 5)**	**Total**
1.00	**THIRD PARTIES, STATUTORY AUTHORITIES AND PLANNING**														
1.01	Design	Planning Application may be required where previously not expected	Delay to programme as application is put together.	TBC	TBC	TfL	2	2	**4**	During Pre-Construction Phase	Details of planning requirements to be checked and discussed post-feasibility work.		1	2	**2**
1.02	Commercial	Changes to agreed funding.	Unable to complete works, or programme delays if awaiting next funding cycle.	TBC	TBC	TfL	1	4	**4**	Project Inception	Close liaison with TfL regarding funding cycles against programme deliverables		1	2	**2**
1.03	Design	Stakeholder engagement is insufficient, resulting in opposition to elements of the project.	Programme delays and increased costs due to project opposition.	TBC	TBC	MM	2	2	**4**	Project Inception	Any impact on potential stakeholders to be identified during project start-up and managed appropriately.		1	2	**2**
2.00	**SITE UKNOWNS**														
2.01	Design	Unknown ground conditions	Delay to programme due to additional works required to manage adverse ground conditions if identified.	TBC	TBC	TfL	2	3	**6**	During Detailed Design	Information from 2010 GI desk study to be reviewed to establish whether further surveys are required.		1	3	**3**
2.02	Design	Available/useable capacity within existing equipment rooms is insufficient leading to review and possible change of requirements	The impact of this risk could result in additional works and extension of programme.	TBC	TBC	TfL	2	2	**4**	Feasibility Surveys	Initial site visual survey to identify potential areas where capacity can be identified		1	2	**2**
3.00	**DESIGN RISKS**														
3.01	Design	Issued design does not fully match the client requirements	Delay to programme due to rework of design following client review and comments.	TBC	TBC	TfL and MM	2	2	**4**	During Design Development	Engage with the client design team regularly throughout the design process to inform them of emerging design, review potential issues as they arise and agree solutions prior to the formal issue of any design deliverable. Essential that engineering leads for both MM & TFL remain consistent throughout the project to maintain knowledge, understanding and continuity		2	1	**2**
3.02	Design	Changes to the traction power required capacity as a result of operational decisions or service patterns	Additional project costs due to resulting increase in scope to accommodate increase traction power demands.	TBC	TBC	TfL and MM	1	4	**4**	Project Inception	TfL to confirm the current understanding of traction power capacity required, including potential increases as modelled.		2	2	**4**
3.03	Design	Work/projects outside this study drives changes in strategy.	The design solutions are impacted as they may not now be suitable causing potential programme delay and cost to accommodate the change and perform the required rework.	TBC	TBC	TfL	2	4	**8**	Project Inception	Scoping and requirements to be established robustly during project kick-off alongside any known likely impacts from other projects/works.		1	2	**2**
3.04	Design	The data provided by TfL has significant errors that are not readily correctable.	Programme delays/cost increase as significant rework is required.	TBC	TBC	TfL	2	4	**8**	As required	PM and CEM monitoring and expert review of data to ensure effective management.		1	4	**4**
3.05	Design	The data provided by TfL has significant omissions that are not readily correctable.	Programme delays/cost increase as significant rework is required.	TBC	TBC	TfL	2	4	**8**	Project Inception	PM and CEM monitoring and expert review of data to ensure effective management.		1	2	**2**
3.06	Design	The chosen rolling stock requires different traction power parameters to those already assumed and modelled by TfL, leading to a change in substation upgrades.	The design solutions are impacted as they may not now be suitable causing potential programme delay and cost to accommodate the change and perform the required rework.	TBC	TBC	TfL	2	4	**8**	Project Inception	Engagement with rolling stock choice as work continues.		2	2	**4**
3.07	Design	The traction power modelling assumptions by TfL leading to the upgrade requirements set out in the TRS for this project are determined to be inappropriate or different assumptions need applying.	The design solutions are impacted as they may not now be suitable causing potential programme delay and cost to accommodate the change and perform the required rework.	TBC	TBC	TfL	2	4	**8**	Project Inception	TfL to confirm the current understanding of traction power capacity required, including potential increases as modelled.		2	2	**4**
3.08	Design	Future tram fleet size not yet finalised, causing changes to design / uncertainty.	The design solutions are impacted as they may not now be suitable causing potential programme delay and cost to accommodate the change and perform the required rework.	TBC	TBC	TfL	2	4	**8**	Project Inception	TfL to confirm the firm number of trams being procured, and the number and type of existing trams being retained.		2	2	**4**
3.09	Design	The design as set out in the TRS later proves to not retain the current level of service capability across the existing network	Less trams in service / overloaded traction power equipment	TBC	TBC	TfL	2	4	**8**	Project Inception	TfL to confirm the current understanding of traction power capacity required, including potential increases as modelled.		2	2	**4**
3.10	Design	Assumptions around fire safety are incorrect, resulting in a change in scope late in the design works.	Programme delays and additional costs due to late stage changes in scope.	TBC	TBC	TfL	2	1	**2**	Project Inception	Assumption to be reviewed and confirmed at project kick-off to confirm validity.		1	1	**1**
3.11	Design	Loss of people with the necessary knowledge, skills and competencies.	Impact to cost and programme to replace staff as well time to familiarise with project.	TBC	TBC	TfL and MM	2	3	**6**	Project Inception and throughout project	Plan and contingencies to be put in place to mitigate any resignations or personell replacements with efficiencies and control of costs in mind. Project records to be stored in Common Data Environment to smooth handovers between staff.		2	1	**2**
4.00	**PROCUREMENT / COST**														
4.01	Commercial	Future increase in building material costs, inc. steel	Greater costs than predicted due to unpredictable rises in material costs due to unforeseen global circumstances.	TBC	TBC	TfL	2	5	**10**	During Concept Design	Risk to be accounted for in costing of works.		2	2	**4**
4.02	Commercial	Value Engineering insufficient to meet cost requirements.	Programme delays as additional funding is obtained.	TBC	TBC	TfL	2	2	**4**	During Concept Design	Value Engineering workshop to be held to enable affordability assessment.		2	1	**2**
4.03	Commercial	Theft of materials and vandalism.	Greater costs than predicted due to replacement of materials stolen and damage to site/equipment. Increased cost of security measures.	TBC	TBC	Contractor	3	4	**12**	Before Construction	Strong security measures to be put in place to deter acts of theft and vandalism but also collect evidence for prosecutions.		2	2	**4**
5.00	**PROGRAMME**														
5.01	Design	Change in requirements following initial discussion impacting predicted programme	Programme delays and/or rework due to late stage scope change.	TBC	TBC	TfL and MM	2	4	**8**	Monthly	Robust requirements and scope to be established during project start-up. Continued regular discussion with the TfL PM on progress and programme. Make sure Project Execution Plan (which includes a Risk Management Plan) aligns with TfL's requirements for the project.		1	4	**4**

Risk ID	Category	Risk description (Event)	Effect	Time (weeks)	Cost (£k)	Owner (accountable)	Current Probability (1 to 5)	Current Impact (1 to 5)	Current Score	Action Due date	Mitigation (Action and/or control)	Current Probability (1 to 5)	Current Impact (1 to 5)	Total
5.02	Design	Delays in obtaining site access when required / delays in obtaining approval for site safety documents will impact the survey programme	Programme delays due to lack of access / access on later dates than needed.	TBC	TBC	TfL and MM	2	4	8	Monthly	Robust planning of surveys, and early submission of access requests. Early submission of site safety documentation. Continued regular discussion with the TfL PM on progress and programme. Liaison / coordination with TfL PM / TfL access planners and MM to be established.	2	3	6
6.00	UTILITIES													
6.01	Programme	The location and capacity of services required for the scope of design are not compatible with the design solution	Programme delays and increased cost due to the need to manage any impacts to utilities/3rd party assets.	TBC	TBC	TfL	2	3	6	During Concept Design	Utilities information provided to be reviewed during inception phase to identify any likely challenges. Also include an ongoing assessment of utilities impacts during regular design reviews	1	2	2
6.02	Design	Unexpected buried services encountered due to incomplete utilities information.	Additional costs/programme delays due to need for safeguarding/relocation of services.	TBC	TBC	TfL	2	3	6	During Concept Design	Evaluation of existing information and additional surveys required at early stage of design.	2	2	4
7.00	CONSTRUCTION													
7.01	Programme	Unexpected ground obstruction/contamination/UXO	Additional cost and programme delay to manage obstruction.	TBC	TBC	TfL	1	4	4	During Detailed Design	Any ground obstructions to be removed during enabling works. Risk would pass on to the contractor.	1	3	3
7.02	Programme	Overstretched supply chain reduces availability of required resources with necessary skills and experience.	Programme delays.	TBC	TBC	TfL	2	3	6	Monthly	Robust programme and early engagement with the supply chain.	1	3	3
7.03	Programme	Adverse weather leading to cancelled work/reduced output/construction error.	Programme delays, increased cost due to rework.	TBC	TBC	TfL	2	2	4	As required	Contractor to manage forecast weather and take appropriate measures/amend programme to work flexibly where needed.	1	1	1
7.04	Programme	Development of design causes changes that impact construction.	Programme delays.	TBC	TBC	TfL and MM	2	3	6	During Detailed Design	Design to follow assurance requirements and as far reasonably practicable to be approved prior to construction. Any changes to be raised through change control and risk reduction meetings to ensure impacts are controlled.	1	3	3
7.05	Programme	Reduced possession times due to unforeseen circumstances.	Programme delays, increased cost due to rentention of staff for further shifts.	TBC	TBC	TfL and Contractor	3	4	12	Monthly during construction	Weekly possession planning to take place with specifically appoint personnel to be responsible for arranging possessions. Contractor to include redundancy shifts to allow for any delays due to possession cancellation.	2	2	4
7.04	Programme	Failure of plant during construction e.g. MEWPs	Programme delays and additional cost due to rehiring equipment.	TBC	TBC	Contractor	3	4	12	Monthly during construction	Contractor to build into construction plan and allow contingencies for provision of spare plant equipment. To be managed through change control, attendance at risk reduction meeting to keep Client suitably informed	2	4	8

5.1 Principal Designer Implementation

Working collaboratively, we will have a crucial influence in how risks to health and safety are managed. As London Trams Power Upgrade Project Director, Sebastien Lechelle will be accountable for the collaborative interface. Accountable to Sebastien Lechelle, our Principal Designer Advisor, Lloyd Edmonds will be responsible for leading our team in delivering the Principal Designer's (PD) and Designer's duties.

We comply with the Construction (Design and Management) Regulations 2015 on every project and have worked on previous design and build projects with many Clients, including TfL and Network Rail delivering PD duties as part of the combined team approach.

All our designers are trained to understand and deliver their CDM duty as designers across all projects they work on. As such they are competent to deliver their roles as part of the PD team.

On all rail projects we prepare a CDM Strategy as part of either the project Design Management Plan (DMP) or the Engineering Safety Management Plan (ESMP). This identifies how CDM duty holders on the project will achieve full compliance under CDM across the project stage(s). By making the CDM Strategy part of the DMP/ESMP for the project, it becomes fully integrated into the design process and is understood by all designers working on the project.

The strategy sets out the process by which we will:

- Clearly communicate risk information and risk management actions between the design team and TfL via regular CDM review workshops and hazard logs, allowing the PD to monitor the Designer, coordinate the Designers' activities during the pre-construction phase and actively ensure the consistency of control measures;
- Manage pre-construction information;
- Manage risks associated with design interfaces and design integration via the processes and procedures set out in the plans for those activities;
- Invite TfL to design team meetings including progressive design reviews, Interdisciplinary Design Checks (IDCs), Interdisciplinary Reviews (IDRs) and Peer Reviews.
- Proactively feed design decision information into the pre-construction information via the regular CDM reviews.
- Where risks cannot be fully eliminated and need to be controlled by the instigation of safe systems of work, communicate these risks via registers and embedding information in Project Information and drawings where appropriate.

The single most valuable element of our work as part of the Principal Designer team on the project is promoting health and safety within the design. Our designers are all trained in the Principles of Protection and our standard procedures apply these to everything we design. We believe that the health and safety within the pre-construction phase can be clearly evidenced within our management of the CDM Hazard Register and recently have had excellent results in enhancing the health and safety aspects of our design through the use of a proactive Design Hazard Management process.

As part of our role, we input into the project RACI chart clarifying roles and responsibilities across the project.

Pre-Construction Information (PCI) is managed as part of the BIM Execution Plan (BEP) on the project. Internally we have a knowledge collaboration and management system which provides practice sites that are our online hubs for sharing knowledge and collaborating as part of a global network. Currently on live projects with other clients we are managing PCI under a number of different Common Data Environments (CDE) including ProjectWise and SharePoint.

As part of the management structure, we have group practice managers, practice leaders, professional excellence, and knowledge managers. This combines to allow access to leading expertise and knowledge on all our projects.

Meticulous records are stored for the following: the competency assessment (part of our ISO9001 QA system), RACI, IDC meetings, workshops, and H&S decisions in order to provide auditable evidence of compliance with the HSE and CSM regulations and relevant TfL procedures.

MML has a number of other specialist qualified safety professionals within its organisation who are available to provide competent health and safety advice to staff.

We have a hierarchy of competent and qualified H&S advisors: a Group Safety Manager; a dedicated Unit Safety Manager per unit; and a Project Safety Advisor (PSA) per project undertaken.

This team of safety advisors within the Business Management System (BMS) Department are part of the corporate services of Mott MacDonald Ltd.

- The Group Safety Manager from whom H&S advice can be obtained by all staff.
- Each unit has an allocated Unit Safety Manager who advises on H&S matters that are focussed on their units.
- We have a range of CDM Advisors across the organisation who have a broad range of sector skills, knowledge, and experience across a broad geographical area.
- The Project Safety Advisor assigned to every project undertaken specifically acts as an immediate source of safety advice. There are over 300 PSA's spread across the region.
- A team of Systems Engineering and Assurance specialists

Internally we have a knowledge collaboration and management system, which provides practice sites that are online hubs for sharing discipline specific advice and support.

Collaborating as part of a global network. As part of the management structure, we have group practice managers, practice leaders, professional excellence, and knowledge managers. These combine to allow access to leading expertise and knowledge from all of our projects.

The format and requirements for the H&S file are agreed as part of the CDM strategy at the beginning of the project. We recommend that a draft copy of the proposed H&S file is issued with the tenders to the contractors. This should help with getting compliant H&S information at the end of the construction phase.

Reporting – We report regularly on how CDM compliance is being maintained on the project. We also recommend a quarterly meeting is held with representatives of the pre-construction duty holders to run through compliance and agree how to close out any outstanding issues.

As a recent example working on High Speed 2 Main Works Civils Contract, which involves multiple disciplines all responsible for CDM duties, Safetibase has been used to record hazards during the pre-construction phase. Significant residual hazards have then been communicated to the Contractor through the BIM model and design documentation, whilst snapshots of the Hazard Register containing all recorded hazards are regularly submitted to support the design assurance process. Collaboration between all CDM Duty Holders, including design teams and construction teams has been possible through the Safetibase workflow process, which each individual hazard must follow.

An example of a Design Risk Assessment completed on a recent project is provided below.

Examples of Mott MacDonald Ltd Principal Designer Management of Pre-Construction Phase Works:

Transport for Greater Manchester - HS2 Growth Strategy Project

The project (prior to recent announcements by the Government) was intended to prepare for the arrival of HS2 into Manchester Piccadilly station. The project required the design of a number of potential modifications to the station and surrounding area. As described above we drafted a CDM Compliance Strategy for the project. This identified how we would maintain compliance across the portfolio of small design activities.

The key issues were the management of a large amount of Pre-Construction Information across various small projects, communication between the design teams across the projects and getting a good record of early hazard management. With the CDM Compliance Strategy in place, we then regularly reported to the client on progress against the strategy.

High Speed 1 - HS1 Decarbonisation project

This covers a major upgrade of the heating and cooling systems at St Pancras, Ebbsfleet and Stratford. The management of Pre-Construction Information has been an important part of the compliance strategy as the client has a limited amount of information on the existing assets which requires the design team to make assumptions early in the design and agree how these assumptions are closed out within the pre-construction phase. Hazard management on this project has been enhanced through Hazard Identification workshops facilitated by the Principal Designer. As with the HS2 Growth Strategy project, we report regularly to our client against the agreed strategy.

An example of a MM Design Risk Assessment completed on a recent project is provided below.

Project Title	TfL Therapia Lane: Depot and Infrastructure Project (D&IP)	**Project number**	100113828
Project Manager	Sandeep Patel	**Division/ unit**	LSE/BNC
PD Lead	John Kyere	**Form number/ revision**	P01.1

Scope of design

This scope of works sits under the Depot & Infrastructure Project (D&IP) and focuses on new stabling and additional stores to prepare the existing depot infrastructure for the introduction of a new fleet. On this basis, the core works at Therapia Lane Depot will consist of:

a)Additional stabling for three ~32m trams within the existing Therapia Lane boundary.
b)Sufficient additional stores for new vehicle spares in two states:
c)An initial temporary storage facility with 300 m² of space
d)Replaced by a future permanent storage case of 45m² floor space. Taking account of circulation space, this would equate to a permanent additional store's facility of around 112.5m².

The key objectives of this procurement are to develop the track and associated design for an additional stabling road to a Acceptance in Principle (AiP) level, develop the design for a permanent and temporary storage area and develop a Construction and Logistics Report for the above work.

Haz ref	Activity/ process/ material/ element – what is being undertaken?	Hazard [1]	Stage of work	Designer risk control measures: [2] Design action taken, record of decision process including options considered, design constraints and justification for options/ actions not having been taken	Is there a 'significant' or 'particular' [3] residual risk to be passed on? [4]	If the answer to the previous question is 'yes', information flow: D/ P/ F [5]	Status within Mott MacDonald
All							
GEN-001	Proposed work within working depot	Construction activity within operational depot; interface between depot operations and construction work.	Construction	Construction and Logistics Plan to be developed with the aim of minimising impact on existing depot operations. Evaluation of the risks arising from the proposed construction plan to be carried out, with significant risks highlighted on the design drawings and in the Construction and Logistics Report. Initial and In-Design ECI workshops to inform the design to make sure construction safety is considered in the proposals alongside limiting impact on operations.	Yes	D	Active
GEN-002	Driving vehicles on site	Collision between staff on foot and moving vehicles	Construction	Contractor to manage all vehicle and pedestrian movements on site during construction following relevant best practice and Health and Safety guidance. The site requires management of pedestrian, tram and vehicular movements during construction. Vehicular areas to be designed to be easily differentiated from walkways. Principal Contractor to develop and implement traffic management plan for the proposed works, particularly on Coomber Way. Reference to this to be made in the Construction and Logistics Plan to limit impact on operations.	No	N/A	Active
Telecoms							
TEL-001	Installation of Telecoms	Electrocution while working on existing assets/telecom cabinets Damage to existing telecoms cabinets, disruption to cabling areas	Construction	Ensuring all power is switched off ahead of work. Make sure existing assets are highlighted and all relevant information provided ahead of works.	No	N/A	Active
TEL-002	Working at height on CCTV and PA speakers	Falling from heights Falling Objects	Construction	Preparation of detailed health and safety plans. Full PPE to be worn at all times. Any scaffolding to be erected by qualified personnel only. No use of ladders are permitted, MEWPS or scaffolding permitted.	No	N/A	Active
TEL-003	Working in confined spaces	Working in confined spaces (including telecommunications assets in chambers).	Construction	Preparation of detailed health and safety plans. Full PPE to be worn at all times.	No	N/A	Active
Traction Power							
TRP-001	Working with HV AC and DC cables, cable connections, switches, supply cabinets, traction substation equipment	Electrocution while working on electrical assets	Construction	Preparation of electrical switching forms and isolation procedures. make sure new earthing points are provided which can be secured to make asset safe. make sure existing electrical assets are isolated and earthed before work through use of appropriate procedures and certificates of isolation. Switching forms and isolation procedures are to be updated for new design.	No	N/A	Active
TRP-002	Modifications to DC cable routes	Electrocution through damage to existing cables / cable strike	Construction	Cable route designs to identify existing DC cables and provide procedures to make sure unmodified existing DC cables are not damaged in the process of construction. Depot DC supply to be completely isolated and earthed before work is carried out on cable routes.	Yes	D	Active
TRP-003	Working in confined spaces / pits for cable routes	Working in confined spaces	Construction	Preparation of detailed health and safety plans. Full PPE to be worn at all times.	No	N/A	Active
EMC							
EMC-001	Installation of cables	Electrocution through damage to existing cables / cable strike Excessive electromagnetic field	Construction	Mott MacDonald to prepare EMC strategy to inform the design and construction.	No	N/A	Active
EMC-002	Cable separation during operation	EMC (induced currents in cables)	Use (as workplace)	Mott MacDonald to prepare EMC strategy to inform the design and construction.	No	N/A	Active

1. A hazard is something with the potential to cause harm, such as: working near live traffic, working at height, falling object etc.
2. Designer risk control measures are to be based upon the principles of prevention: - eliminate, reduce, inform/ isolate, control.
3. 'Significant risk' is the UK terminology; 'particular risk is the EU terminology.
4. Significant/ particular risks are not necessarily those that involve the greatest risks, but those, including health risks that are: (a) not likely to be obvious to a competent contractor or other designers; (b) unusual; or (c) likely to be difficult to manage effectively.
5. Please note that this information may also be relevant to specifications and/ or reports. D - Information detailed on drawings (add drawing numbers); P - Information to be communicated via pre-construction information; F - Information for the health and safety file

5.2 Top 5 H&S Hazards & Risks

Mott MacDonald Ltd.'s (MML) perceived top 5 Health and Safety hazards, associated risks and control measures are detailed in **Appendix B**. In summary, they are:

- Working on Rail Systems
- Working in Substations
- Poor Project Team Wellbeing
- Poor Communication
- Poor / Inadequate / unsafe design

Details of how these are communicated to those affected follow:

On a typical project, the Project Safety Adviser (PSA) (with assistance from the project Lead Engineer and the Rail Health and Safety team, if required) will undertake a Health and Safety Risk Assessment to identify all foreseeable hazards on the project, these are assessed, risks identified, mitigations recorded, and the residual risk scored for severity. The completed MMF100 Health, safety, and wellbeing risk assessment (HSWRA) is shared to and read by every project team member as they join the project, with the MMF100 Health, safety, and wellbeing risk assessment (HSWRA) being signed to confirm understanding by every team member. This is repeated at a frequency determined at the assessment meeting.

Any site visit can only occur after completion of the required site safety paperwork, a confirmed booking, acceptance by the Client and approval of MML's internal rail safety advisors. Site safety details are briefed out to staff both before and at the start of site visit. This means that risk control measures can be communicated before and at the start of any site work. Any risk control measures applicable to office / home based locations or design work will be briefed out regularly during internal team meetings.

MML has a number of specialist qualified safety professionals within its organisation who are available to provide competent health and safety advice to staff. We have a hierarchy of competent and qualified H&S advisors: a Group Safety Manager; a dedicated Unit Safety Manager; and a PSA per project undertaken. This team of safety advisors within the Business Management System (BMS) Department are part of the corporate services of Mott MacDonald Ltd.

The single most valuable element of our work as part of the Principal Design team on the project is **PROMOTING HEALTH AND SAFETY WITHIN THE DESIGN**.

Building in and managing residual risks is a critical aspect of any risk management strategy. All Disciplines will produce Design Risk Assessments, as part of the design development. All risks, including mitigated and residual risks, will be added to the Project Design Hazard Log, sometimes referred to a Designer's Hazard Elimination Record (DHEMR). This contains important information including but not limited to, hazard description, control measures, residual risks (if any), evaluation of residual risk levels, stage(s) the risk is active, where the risk is communicated in terms of design documentation, action owner for monitoring and review, mitigations & controls that need to be implemented and whom the risk needs to be communicated with. This will remain a live document that will be handed over at the completion of works.

5.3 H&S Competencies

Provide details of H&S competencies (skills, knowledge, and experience) of the delivery team including the Project Manager, and details of the process by which these competencies are managed.

Our commitment to the Health & Safety of our employees, customers and partners is of paramount importance. Creating and maintaining a safe and healthy environment is a core value of our organization.

The entire project team has been through a mandatory induction process, which will have included complete training in the following areas:

- Safe by Design (otherwise known as CDM Regulations 2015 training)
- SAFER Construction, Healthier on Site
- Safety Wheel Workshop
- The cost of accidents
- The Safe Way to Work

Some of the above courses must be repeated every few years, process of which is managed by the Business Management System (BMS) team with timely reminders, which is automated via Power BI apps. Training records can be provided on request.

The Railways Professional Head, Joseph Cosgrave, who is listed in the project team is responsible for H&S management for UK Rail. This is administered via the MML UK Railway Instructions (UKRI's), led by the Railway Safety Team. The UKRI's and supporting Policies apply to all resource groups that carry out any works on projects that can affect the safety or operation of a UK rail system, rail workers and/or those who use the infrastructure. The Railways Professional Head is also responsible, delegated down to discipline Professional Heads, for railways safety briefings and standard briefing updates, to ensure staff are up to date with safety practices and innovations.

The Railway Safety team deals with ensuring all staff are sponsored on the Sentinel Scheme, manages training such as Track Safety, Level C, Industry Common Induction and ensures project activities are carried out in accordance with the UKRI's. This is critical for maintaining RISQS audit certification. Site safety is also managed via the UKRI's, through the Railway Safety team. This includes a mandatory requirement for any site work on Railways done by or on behalf of Mott MacDonald going through a rigorous Authority to Proceed to ensure all safe systems of work and risk assessment as well as competent staff are in place in advance of attending site including issuing of track visitor permits if required. The Railway Safety Team also maintains the drugs and alcohol test procedures informing project team members of any mandatory tests & records of medical expiry dates. The Railway Safety Team also manage expiry dates of Railway Safety related training (i.e., outside the mandatory requirements).

The project team has experience of producing health and safety risk assessments, task briefing sheets and surveying experience in their relevant discipline. Furthermore, as per the training the project team, executes all projects with a safe by design philosophy, including ensuring designers risk assessments are carried out and clear communication of residual hazards on design documentation.
Project Management competencies are managed through an app called the PM Tracker Passport. The Project Manager, in this case Paula Lovell, brings 7+ years of experience in project management including implementing the health and safety governance on projects. Activities of Project Management or appropriate delegates include regular project safety reviews as well as maintaining a health and safety risk assessment register, carrying out safety tours and inspections.
The project team include members that are well versed with executing the Common Safety Method – Risk Assessment (CSM-RA) in line with the mandatory European risk management process for the rail industry. For each discipline the technical leads are trained via internal eLearning course and experienced in CSM-RA, which is a mandatory requirement for fulfilling the role. As described above completion of this course is recorded and tracked via the BMS.

5.4 Principal Contractor

Colas Rail is well-prepared to fulfil the Principal Contractor role for this contract in accordance with the CDM 2015 Regulations. We prioritize the general principles of prevention throughout the project to ensure the health, safety, and well-being of all stakeholders involved.

Under this contract, Mott MacDonald are Principal Designer and Colas Rail are Principal Contractor. Colas Rail duties under CDM Regulations 2015 are:

- CRL will plan, manage, monitor and coordinate the entire construction phase.
- Take account of the health and safety risks to all affected by the work (including members of the public), in planning and managing the measures needed to control them.
- Liaise with TfL, TOL and Mott MacDonald to make sure that all risks are effectively managed.
- Prepare the construction phase plan before the construction phase begins, implement, and then regularly review and revise it.
- Check that anyone they appoint has the skills, knowledge, experience and, where relevant, the organizational capability to carry out their work safely and without risk to health.
- Prevent unauthorized access to the site.
- Make sure all workers have site-specific inductions, and any further information and training they need.

In terms of previous experience, we have acted as the Principal Contractor on several ground investigation surveys of similar scale and nature. Two notable examples include:

- **West Midland Metro – Line 1. Power Upgrades**
  The project includes upgrades to existing substations and the creating of new substations to bring resilience to the networks. We were appointed as the Principal Contractor for a ground investigation survey in the West Midlands Metro network. The survey activities required close coordination with multiple stakeholders, including utility companies and local authorities. Our team effectively managed and coordinated the survey activities by closely collaborating with these stakeholders. We conducted regular site meetings to ensure that everyone was aware of the survey activities and to address any concerns or conflicts that arose. This proactive approach enabled us to complete the survey activities within the planned timeframe and with minimal disruption to the surrounding area.

- **Wessex Capacity Alliance – Power Upgrades**
  The project enhanced the capacity of Waterloo station and the south railway lines Wessex to increase the power and renew the infrastructure. We acted as the Principal Contractor for a ground investigation survey in a challenging terrain. To ensure the smooth coordination and management of the survey activities, we followed a robust approach that involved close liaison with other duty holders. We held regular meetings and briefings to discuss and coordinate the survey activities with the client, designers, and subcontractors. We implemented a clear communication plan which enabled efficient information flow and facilitated the collaborative efforts of all involved parties.

In both cases, we successfully managed and coordinated the survey activities while complying with CDM regulations.

Our global list of references including high and low voltage are:

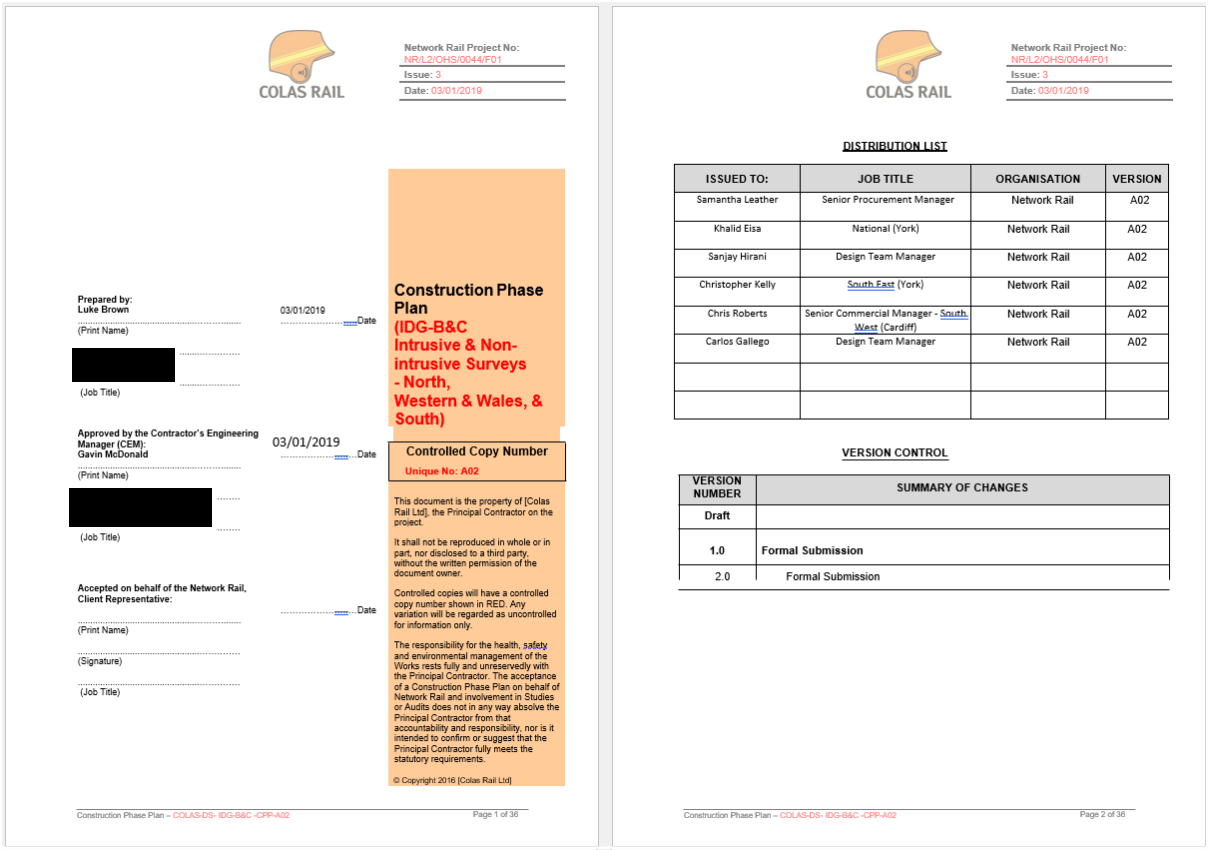
Project	Date	Track Works	Overhead Lines & 3rd RAIL	Low Voltage - Signaling	High Voltage
Egypt – Cairo Métro	2013	●	●		●
Morocco – Rabat Tramway	2011	●			
Morocco – Rabat Tramway	2020	●			
Tunisia – Tunis RFR	2016	●	●	●	●
Serbia – Belgrade Tramway	2017	●	●	●	●
Belgium – Charleroi Tramway	2011		●		
Belgium – Liège Tramway	2019	●	●		●
Venezuela – Caracas Métro	2015	●			●
Chile – Santiago Métro & Maintenance	2018	●	●		
Canada – Toronto - Finch West LRT	2020	●			
Canada – Edmonton Valley line west LRT	2020	●	●	●	●
Indonesia – Jabodebek (LRT)	2020	●			
Singapore – Bukit Panjang light rail transit*	2022				●
Vietnam – Hanoi –Métro-L 3	2021	●			●
Malaysia – Kelana Jaya Line Extension	2014	●			●
LGV BPL	2017	●	●		
LGV Est Européenne	2007	●	●		●
LGV Méditerranée	2013	●	●	●	
LGV-CR-maintenance-Nîmes / Montpellier	2012	●	●	●	●
LGV Rhin / Rhône	2012	●			●
SNCF R-Saintes Baillant	2020	●			
SNCF R-CR-Niort / la Rochelle	2017	●			
SNCF R-La Rochelle -La Roche Sur Yon	2012	●			
SNCF R – Ligne des HORLOGER	2021	●			
SNCF R- Belfort / Delle	2018	●	●	●	
SNCF R- Boulogne / Rang du Fliers	2021		●		
SNCF R- Gretz Troyes	2020		●		
SNCF R-Etoile St Pol	2019	●			
SNCF R- Le Puy / Firminy	2014	●	●	●	
SNCF R- Serqueux /Gisors	2020	●	●		
SNCF R -CR – Sillon Alpin Sud	2013	●	●		●
SNCF R- Toulon / Hyères	2015	●			
CEVA – Genève /Annemasse(FR)	2019	●	●	●	●
Port maritime du Havre	2012	●	●	●	
RATP Régénération RER A	2021	●			
SNCF R Régénération / Maintenance	2020	●	●	●	
Guinee – GAC Guinée Conakry	2018	●			
Morocco – Kenitra / Sidi Kacem	2002	●	●		
Morocco – LGV Tanger / Kenitra	2017	●	●		●
Luxembourg	2018	●	●		
Germany – Stadtbahn / Berlin	1998	●		●	
Italy – HSL Turin / Milan	2013				●
South Korea – TGV Séoul / Pusan	2001		●		●
UK – Channel Tunnel & Maintenance*	2022	●			
Algeria – Alger Métro Extension A C	2014	●	●	●	●

Project	Date	Track Works	Overhead Lines & 3rd RAIL	Low Voltage - Signaling	High Voltage
UK – West Midlands Metro	2016	●	●	●	●
UK – Croydon Tramlink	2014	●			
UK – Docklands Light Rail-London	2014	●		●	●
UK – Docklands Light Rail-Woolwich Arsenal Extension	2012	●		●	●
UK – Glasgow Subway	2015	●		●	●
Angers Tramway Ligne A	2011	●	●		
Angers Tramway Ligne B C *	2022	●		●	
Besançon Tramway	2014	●	●		
Bordeaux Tramway Extension D-C	2019	●	●	●	
Bordeaux Tramway Extension A	2008	●	●	●	
Brest Tramway	2012		●	●	
Caen Tramway	2018	●	●		
Clermont Ferrand Tramway	2014	●	●	●	●
Dijon Tramway	2012	●			
Grenoble Tramway	2016	●	●		
Le Mans Tramway	2014	●	●		
Lille Métro	2012	●			●
Lyon Métro -Extention Ligne B*	2022	●			
Lyon Tramway Extention T4-T2	2010		●		●
Marseille Métro	2014	●	●	●	●
Marseille Tramway	2011	●	●	●	●
Mulhouse Tramway	2008	●		●	
Nantes Tramway	2020	●			
Nice Tramway Ligne 2 et 3	2019				●
Orleans Tramway	2019	●	●		
Paris & IdF Tramway	2013	●	●	●	
Paris & IdF Métro	2012	●		●	
Métro Grand Paris – L15 Sud/ Est*	2018	●	●		
Métro Grand Paris – L18 *	2024				●
Reims Tramway	2021	●	●		●
Rennes Métro	2016	●			●
St Etienne Tramway ligne 3	2020				●
Strasbourg Tramway	2016	●	●		●
Toulouse Tramway	2015	●	●	●	●
Tours Tramway	2013		●		●
Valenciennes Tramway	2014	●	●	●	●
Morocco – Casablanca Tramway ligne T1	2012	●	●	●	●
Morocco – Casablanca Tramway ligne T2	2019	●	●		●
Morocco – Casablanca Tramway ligne T3-T4*	2024	●	●	●	

During these surveys, effective communication, and liaison with other CDM duty holders played a crucial role in ensuring the smooth execution of the project. We established open lines of communication with clients, designers, contractors, and other relevant parties to facilitate cooperation and coordinated effort. Regular meetings and consultations were held to address any emerging issues, mitigate risks, and ensure compliance with CDM requirements.

Colas Rail has a strong track record in producing comprehensive Construction Phase Plans for similar survey activities. These plans consider the specific requirements of each project and include detailed information on how health and safety risks will be managed and controlled during the construction phase. Our Construction Phase Plans outline the procedures, protocols, and measures that will be implemented to ensure a safe and efficient working environment. They cover areas such as site access, welfare facilities, traffic management, hazardous substances, and emergency procedures.

This is an example of the Construction Phase Plan we use for ground investigation surveys as required.



COLAS RAIL

Network Rail Project No: NR/L2/OHS/0044/F01
Issue: 3
Date: 03/01/2019

Prepared by:
Luke Brown — 03/01/2019 Date
(Print Name)
[redacted]
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Approved by the Contractor's Engineering Manager (CEM):
Gavin McDonald — 03/01/2019 Date
(Print Name)
[redacted]
(Job Title)

Accepted on behalf of the Network Rail, Client Representative:
Date
(Print Name)
(Signature)
(Job Title)

Construction Phase Plan (IDG-B&C Intrusive & Non-intrusive Surveys - North, Western & Wales, & South)

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The responsibility for the health, safety and environmental management of the Works rests fully and unreservedly with the Principal Contractor. The acceptance of a Construction Phase Plan on behalf of Network Rail and involvement in Studies or Audits does not in any way absolve the Principal Contractor from that accountability and responsibility, nor is it intended to confirm or suggest that the Principal Contractor fully meets the statutory requirements.

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ISSUED TO:	JOB TITLE	ORGANISATION	VERSION
Samantha Leather	Senior Procurement Manager	Network Rail	A02
Khalid Eisa	National (York)	Network Rail	A02
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Christopher Kelly	South East (York)	Network Rail	A02
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VERSION CONTROL

VERSION NUMBER	SUMMARY OF CHANGES
Draft	
1.0	Formal Submission
2.0	Formal Submission

COLAS RAIL
Network Rail Project No: NR/L2/OHS/0044/F01
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Date: 03/01/2019

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COLAS RAIL
Network Rail Project No: NR/L2/OHS/0044/F01
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1 Introduction

1.1 Purpose of the construction phase plan

1.1.1 This Construction Phase Plan describes how the health and safety risks associated with the project shall be identified and managed by the (Principal) Contractor throughout the construction phase. It has been compiled using pre-construction information provided by the Client.

1.1.2 The procedures contained within this Construction Phase Plan do not absolve or prejudice any statutory requirements and guidelines that might be in force at any

By implementing a robust Principal Contractor role and adhering to the general principles of prevention outlined in the CDM 2015 Regulations, Colas Rail is confident in our ability to successfully deliver this contract while ensuring the highest standards of health and safety.