

DATED

2018

(1) TRAMTRACK CROYDON LIMITED

(2) ENGINEERING SUPPORT GROUP LIMITED

**CONTRACT FOR THE SUPPLY OF AN OVER SPEEDING
PREVENTION DEVICE AND
RELATED SERVICES**

TCL Contract Reference Number: **LT-C-17-466**

Eversheds Sutherland (International) LLP

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THIS CONTRACT is made the day of 4th January 2018/9

BETWEEN

- (1) **Tramtrack Croydon Limited**, a company incorporated in England and Wales (under company registration number 03092613), whose registered office is at 55 Broadway, London SW1H 0BD, England ("**TCL**"); and
- (2) **Engineering Support Group Limited**, a company registered in England and Wales under company registration number 03038421), whose registered office is at Lakeside Business Park, Carolina Way, Doncaster, South Yorkshire, DN4 5PN (the "**Contractor**").

BACKGROUND

- (A) TCL is a wholly owned subsidiary of Transport for London (TfL). TCL owns the Croydon tram-infrastructure and is responsible for the operation of the tram network. In connection with this, TCL requires a physical overspeeding prevention system to be designed, supplied and installed on the trams and on the track infrastructure as required and for the system to be connected with and provide reports to the TCL control system.
- (B) The Contractor holds itself out as an expert in the design, supply, and installation of overspeeding prevention systems as required by TCL.
- (C) TCL advertised the project in the Official Journal of the European Union on 16 May 2018.
- (D) On 10 August 2018, TCL issued an Invitation to Tender and invited potential Contractors to submit tenders, in respect of the project and on 15 November 2018 the Contractor submitted its tender for the same.
- (E) TCL has selected the Contractor to act as its supplier in relation to the project, subject to the terms and conditions contained herein.
- (F) The Parties agree as follows:

OPERATIVE PROVISIONS

1. DEFINITIONS AND INTERPRETATION

- 1.1 In this Contract, unless the context indicates otherwise, the following expressions have the following meanings:

"Acceptance Tests" the tests to be identified in accordance with the procedures set out in the Technical Assurance Plan to be successfully carried out by the Contractor, on or before each Planned Acceptance Date, in accordance with the Acceptance Procedures, in order for the System to achieve Acceptance at each of the relevant stages

"Acceptance" in relation to each key stage, the passing by the System of the relevant Acceptance Tests in accordance with the terms of this Contract ; and "**System Acceptance**", "**Final**

	Acceptance , Accept and Accepted shall be construed accordingly
"Acceptance Date"	in relation to each key stage, the actual date that Acceptance for that stage occurs, with the Acceptance Date for each stage referred to as being either the "System Acceptance Date" , and the "Final Acceptance Date"
"Acceptance Procedures"	the procedures, test plan and test strategy to be adopted in accordance with the terms set out in the Technical Assurance Plan
"Business Day"	any day excluding Saturdays, Sundays or English public holidays
"CCN"	a contract change note, as defined in Schedule 9
"Change Control Procedure"	the change control and contract variation procedure set out in Schedule 9
"Charges"	the charges as detailed in Schedule 4
"Confidential Information"	in respect of TCL, all information (whether written or verbal) that by its nature is confidential (whether commercial, financial, technical or otherwise) including, but not limited to, information which relates to the business affairs, customers, suppliers, products, software, telecommunications, networks, trade secrets, know-how or personnel of any member of the TfL Group and any other information which may be reasonably regarded as confidential by any member of the TfL Group. In respect of the Contractor, all information listed in Schedule 1
"Contract Reference Number"	the TCL reference number for this Contract as set out in Schedule 1 and on the front cover of the document
"Contract"	this contract, including the Schedules and all other documents referred to herein; and incorporating any CCN, and any other valid and binding amendment or variation made from time to time
"Contractor Materials"	has the meaning set out in clause 30.5
"Contractor Personnel"	those agents and employees of the Contractor engaged from time to time in performing the Contractor's obligations under this Contract, the Permitted Sub-contractors and any agents and employees of the Permitted Sub-contractors who are so engaged
"Contractor Project Manager"	the person named as such in Schedule 1 or such other person as notified to TCL by the Contractor as is performing

the lead project management role in relation to this Contract for and on behalf of the Contractor

"Cyber Security Policy"

TfL's cyber security policy in force from time to time the policy at the date of this Contract being set out at **Schedule 10**

"Data Protection Legislation"

means:

(a) any legislation in force from time to time in the United Kingdom which implements the European Community's Directive 95/46/EC and Directive 2002/58/EC, including but not limited to the Data Protection Act 1998 and the Privacy and Electronic Communications (EC Directive) Regulations 2003;

(b) from 25 May 2018 only, the Regulation (EU) 2016/679 on the protection of natural persons with regard to the Processing of personal data and on the free movement of such data (the "General Data Protection Regulation");

(c) any other legislation in force from time to time in the United Kingdom relating to privacy and/or the Processing of Personal Data; and

(d) any statutory codes of practice issued by the Information Commissioner in relation to such legislation.

"Deliverables"

the Devices, Software, operating manuals, user guides, maintenance drawings, schematics, documentation and all other related information to be made available to TCL by the Contractor pursuant to this Contract, including those set out in the Technical Assurance Plan

"Devices"

the overspeeding devices to be supplied by the Contractor as such devices are detailed in the Specification) together with, and including in each case, any related installation, commissioning, testing and integration work which is provided by the Contractor as part of the supply of such device, all of which is, as at the Effective Date, listed in the Specification

"Effective Date"

the date appearing at the front of this Agreement

"Employers Requirements"

the Employers Requirements as set out in **Schedule 2**

"Force Majeure Event"

means any of the following: (a) riot, civil unrest, war, act of terrorism, fire, earthquake, extraordinary storm, flood or other natural catastrophe; or (b) the unexpected discovery

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of, or occurrence of, any hazard at any TCL Premises which may affect the health and safety of any personnel present at such premises, to the extent that such hazard is outside the control of the Affected Party (as defined in **clause 36**); or (c) any other event that is (i) beyond the reasonable control of the Affected Party and (ii) not reasonably foreseeable or, if foreseeable, is not avoidable by the adoption of all reasonable precautions; and in each case which has materially affected the ability of the Affected Party to perform its obligations in accordance with the terms of this Contract

"Good Industry Practice"

in relation to any undertaking and any circumstances, the exercise of the degree of skill, care, prudence and foresight which would be expected from a skilled and experienced person engaged in the same type of undertaking under the same or similar circumstances and seeking in good faith to comply with its contractual obligations and all applicable laws

"Handover and Handback Requirements"

the requirements set out in **Schedule 8** for handing over Trams from TCL to the Contractor, and for the Contractor to hand the Trams back to TCL on completion of the relevant services and works

"Health Safety and Environmental Considerations"

The health, safety and environmental considerations specified by TCL from time to time the applicable considerations at the date of this Contract being set out in **Schedule 7**

"Indemnified Parties"

TCL, its employees and agents, any member of the TfL Group and any third party operator of the London Trams or the TCL Premises

"Intellectual Property Rights"

any patent, patent application, know-how or trade secrets, trade mark or name, design right, copyright (including future copyright), database right, know-how, moral rights, topography rights, rights in commercial or technical information or any other intellectual property rights, whether registered or unregistered and including applications for the grant of any such rights and all rights or forms of protection having equivalent or similar effect anywhere in the world, and including the right to apply for any of them and any extensions and/or renewals

"Key Personnel"

those persons, job titles and/or positions which are essential to the performance by the Contractor of its obligations in the Contract identified in **Schedule 1**

"Liquidated Damages"

the compensation payments due to TCL in the event of

or "LDs"	failure or delay by the Contractor in the performance of the Contractor's obligations in this Contract to achieve Acceptance by the Final Acceptances Date, particulars of which compensation payments (and the method of calculation) are as set out in clause 24
"Losses"	has the meaning set out in clause 27.3
"NCC"	NCC Group Plc, of Manchester Technology Centre, Oxford Road, Manchester M1 7EF, England or such other escrow agent as the Parties agree from time to time
"Network Services"	the communications network services comprising the radio and fixed wire communication links connecting the Devices to the TCL System together with any ancillary infrastructure and equipment (including appropriate rights to put equipment on aerial sites), as described in the Specification, which are necessary to ensure the System operates in accordance with the Service Levels and the Specification, all of which services are to be provided under Network Services Contracts from third party network providers pursuant to and on the terms of clause 4 , together with any addition to or variation of the Network Services made pursuant to a CCN
"Operating Environment"	the environment within which the Contractor will supply and install the Devices and carry out the Services including in particular, but without limitation: <ul style="list-style-type: none"> (a) the physical technical and operational/commercial environment; and (b) the TCL System
"Party" or "Parties"	either or both of the parties to this Contract and their successors and permitted assignees
"Permitted Sub-contractors"	those parties named and listed in Schedule 11 in relation to the activities specified for each such party in Schedule 1 and any others added to the list by prior written agreement of the Parties
"Personal Data"	has the meaning given to it in the Data Protection Legislation
"Planned Acceptance Date"	the date(s) given in the Project Plan, on or before which, the Contractor shall in respect of the relevant part of the System, or the whole of the System (as the case may be) achieve Acceptance and "Planned Final Acceptance

	Date	shall be construed accordingly
"Processing"		in the context of Personal Data, has the meaning given to it by section 1(1) of the Data Protection Act 1998
"Project Managers"		in relation to TCL, the TCL Project Manager and, in relation to the Contractor, the Contractor Project Manager
"Project Plan"		the plan set out in Schedule 5
"Required Insurances"		the insurances specified in clause 28.2
"Services"		the services described in the Specification and the Handover and Handback requirements as are to be provided by the Contractor in accordance with this Contract
"Service Levels"		the Service Levels which the Contractor is obliged to comply with in the provision of the Services specified in the Specification
"Software"		any and all, computer programs, code (whether Source Code, object or machine code) and any other software forming part of the System, from time to time, to be supplied by the Contractor, including operating software, program products, application software, and any software provided which is integral to any Device; and including also any enhancement, modification, patch or new release of such software available to the Contractor
"Source Code"		the Software in eye-readable form and in such form that it can be compiled or interpreted into equivalent object code together with all operating manuals and other technical information and documentation necessary to enable a reasonably skilled programmer to use, reproduce, modify, develop and exploit the Software
"Specification"		means the Employers Requirements and the Technical Assurance Plan
"Sub-contractor"		a sub-contractor of the Contractor engaged (in accordance with the terms of this Contract) in connection with the supply of Devices, the Services, or the Network Services, or any part thereof
"Successor Contractor"		any replacement contractor or contractors (including TCL) appointed by TCL to supply Devices or devices similar to Devices and related services and/or to operate and maintain the System.
"System"		the overspeeding protection system which is:

- (a) described in the Specification including all Devices and Software and networks, stipulated therein; and
- (b) any addition or variation to the System made pursuant to a CCN

System Warranty	The warranty given by the Contractor in relation to the System as detailed in the Specification
"TCL Account Details"	TCL's relevant account code and cost centre as set out in Schedule 1
"TfL Policies"	shall have the definition given to it in clause 15.5
"TCL Premises"	land or premises (including temporary buildings) owned or occupied by TCL, or any operator of London Trams , or any member of the TfL Group
"TCL Project Manager"	the person named as such in Schedule 1 or such other person as notified to the Contractor by TCL as is performing the lead project management role in relation to this Contract for and on behalf of TCL
"TCL System"	The system of TCL to which the Devices shall be connected by the Contractor
"Technical Assurance Plan"	as set out in Schedule 3 (including the Master Document List)
"TfL Group"	Transport for London (" TfL ") and all its subsidiaries (as defined in section 736 of the Companies Act 1985) from time to time
"Third Party Software"	the software listed in Schedule 12 and any additional third party software forming part of the Software that may be incorporated into the System only in accordance with clause 30.9
"Track"	The track (and within 2 metres of the rails) upon which the Trams operate
"Training Services"	the provision by the Contractor of training and advice in respect of the use and operation of the Devices as detailed in the Specification and the Handover and Handback Requirements which Training Services are part of the Services
"Tram"	A rail mounted vehicle operating on the network known as London Trams

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"VAT"	value added tax, as provided for in the Value Added Tax Act 1994, and any tax replacing the same or of a similar nature
"Virus"	any "back door", "trojan horse", "worm", "drop dead device", "virus", "time bomb" or other software routine intended or designed to impair the operability of, or enable unauthorised access rights to, hardware or software or to delete or corrupt data
"Warranty Period"	The period of 24 months from Final Acceptance Date

- 1.2 A reference to the singular includes the plural and vice versa, and a reference to the masculine includes the feminine and the neuter.
- 1.3 A reference to any statute, enactment, order, regulation or other similar instrument shall be construed as a reference to the statute, enactment, order, regulation or instrument as amended or re-enacted by any subsequent statute, enactment, order, regulation or instrument.
- 1.4 A reference to any document other than as specified in **clause 1.3** shall be construed as a reference to the document as at the date of execution of this Contract.
- 1.5 Use of the words "includes" or "including" means without limitation.
- 1.6 Headings are included in this Contract for ease of reference only and do not affect the interpretation or construction of this Contract.
- 1.7 References to clauses and Schedules are, unless otherwise provided, references to clauses of, and Schedules to this Contract.
- 1.8 In the event, and only to the extent, of any conflict between the clauses, the Schedules or any other document referred to in or incorporated into this Contract, the order of priority for the purposes of construction is:
- 1.8.1 the clauses;
 - 1.8.2 the Specification;
 - 1.8.3 the remaining Schedules (save where the conflicting part of the Schedule is explicitly expressed to take precedence over a clause); and
 - 1.8.4 any other document referred to or incorporated into the Contract.
- 1.9 Any reference to records or other information means records or other information in any form in which those records or that information is stored, whether in paper form, electronic form or in any other medium.

- 1.10 Any obligation on the Contractor to comply with standards, policies, procedures or the like shall be an obligation on the Contractor to comply with the same as they shall be amended from time to time.

2. **COMMENCEMENT AND DURATION**

- 2.1 The provisions of this Contract shall take effect and be binding upon the Parties on the Effective Date and shall continue thereafter until the Contractor has completed all of the Services or until earlier termination of this Contract (if applicable).

3. **SUPPLY AND INSTALLATION OF THE DEVICES AND THE SYSTEM**

- 3.1 Immediately after the Effective Date, the Contractor shall, subject to the terms and conditions of this Contract proceed to supply, deliver, install, commission, integrate, test and bring into service the Devices and the System:

3.1.1 promptly and diligently and fully in accordance with the Specification and the Project Plan;

3.1.2 in a sound substantial and workmanlike manner, and following Good Industry Practice;

3.1.3 using all due skill and care;

3.1.4 using suitably qualified and trained Contractor Personnel, and without using any sub-contractors other than the Permitted Sub Contractors;

3.1.5 complying with all relevant approvals, consents, permissions (including any from third parties), applicable laws, rules, regulations and within the lawful requirements of local and public authorities;

3.1.6 without infringing the Intellectual Property Rights of any third party;

3.1.7 in accordance with ISO 9001 and ISO 14001 and the standards specified in the Specification;

3.1.8 in accordance with the software design process in EN50 657, EN50 128 or equivalent; and

3.1.9 in all respects, fully in accordance with the Contract.

- 3.2 For the avoidance of doubt, the Contractor agrees, acknowledges and confirms that:

3.2.1 prior to the Effective Date it carried out, with the co-operation of TCL, a full and comprehensive investigative due diligence in relation to the Operating Environment, and had a full opportunity to ask questions of TCL and consider responses from TCL on matters relating to the Operating Environment;

3.2.2 it undertook, and remains fully responsible for the design of the System as described in the Specification, and is satisfied that the System will interface

seamlessly and satisfactorily with the TCL System as defined in the Specification and will operate with no adverse effect on the TCL System; and

- 3.2.3 it has relevant experience in accordance with the standards set out in EN50 155 and EN50 121-3-2.
- 3.3 Subject to **clause 3.5**, the Contractor shall achieve Acceptance of each stage as specified in the Project Plan, on or before the relevant Planned Acceptance Date.
- 3.4 The Contractor warrants as follows in relation to the System:
 - 3.4.1 the System will, on the Final Acceptance Date and at all times thereafter whilst this Contract remains in force operate and perform to at least the standard described in the Specification;
 - 3.4.2 the System provided will achieve reliability and maintainability objectives in compliance with RAMS EN50 126; and
 - 3.4.3 that in the event of any defect or failure in the System, or any part thereof, during the Warranty Period the Contractor will repair or replace the relevant item at no cost to TCL and in accordance with the System Warranty.
- 3.5 The Contractor shall only be relieved of the obligation in **clause 3.3** in circumstances where it has complied with **clause 3.6** and there is:
 - 3.5.1 a delay by TCL in ensuring the availability of the Trams or infrastructure at the times required (unless such a delay is caused by an act or omission of the Contractor) (a "**TCL Delay**"); and/or
 - 3.5.2 a delay caused by a Force Majeure Event (a "**Force Majeure Event Delay**")

in each case, solely to the extent that the Contractor is prevented from achieving Acceptance as a consequence of an TCL Delay, or a Force Majeure Event Delay. In such a case the Contractor shall be granted an extension of time (by way of a deemed extension to the Planned Acceptance Date) to fulfil its obligations, such extension to run for a period equivalent to the period of the TCL Delay or the period of the Force Majeure Event Delay.

- 3.6 The Contractor shall promptly inform TCL (and thereafter keep TCL regularly updated) of any delay in achieving any milestone date set out in the Project Plan (including any delay in the performance of third party suppliers). In such circumstances the Contractor shall notify TCL of the reasons for such a delay (and in particular specifying if there is an TCL Delay and/or a Force Majeure Event Delay) and, without prejudice to the provisions of **clause 3.5**, the Contractor shall:
 - 3.6.1 notify TCL of the action it proposes to take to ensure that such delay does not impact the achievement of any Planned Acceptance Date and where delay to a Planned Acceptance Date is unavoidable the action it proposes to take to minimise such delay and to ensure that future Planned Acceptance Dates remain unaffected by the delay;

- 3.6.2 subject to **clause 3.8**, take all reasonable actions to avoid any delay to a Planned Acceptance Date (including the deployment of additional personnel where appropriate). The Parties agree that where such actions are required as a result of an TCL Delay, then the Contractor shall be entitled to recover its costs of taking such actions in accordance with the provisions of **clause 3.9**; and
- 3.6.3 on request, other than in respect of an TCL Delay or a Force Majeure Event Delay, demonstrate to TCL how it will ensure that the factors that resulted in the delay will not cause any future delays. In respect of a Force Majeure Delay, the Contractor shall inform TCL of the reasonable steps it will take to minimise the impact of the event re-occurring, and will take such steps.
- 3.7 If the Contractor fails to implement the action proposed pursuant to **clause 3.6.2** or if such action is not, in TCL's reasonable opinion, adequate to minimise the effect of the delay, TCL shall, subject to **clause 3.8**, be entitled to require the Contractor to take such additional steps as it reasonably considers to be necessary to rectify the situation. This shall be at the cost of the Contractor.
- 3.8 The Contractor acknowledges that its remedies for a TCL Delay shall be limited to (a) the remedy stipulated in **clause 3.5** (extension of time); and (b) subject to **clause 3.9**, a right to recover the Contractor's reasonable costs that arise directly as a result of the TCL Delay under. For the avoidance of doubt, the Contractor shall have no additional financial remedy arising from any TCL Delay.
- 3.9 The Contractor shall mitigate the impact of any TCL Delay so as to minimise the costs that the Contractor is entitled to recover under this **clause 3** and the Contractor shall demonstrate to TCL's reasonable satisfaction how it is complying with this obligation to mitigate.
- 3.10 In addition to the supply of Devices as specified in the Specification, the Contractor will also provide TCL with an option to purchase additional Devices and a price for the Contractor to supply, deliver, install, commission, integrate, test and bring into service such additional Devices at additional sites. Such option to purchase shall be available for TCL to exercise for a period of 5 years from the Effective Date.

4. **PROVISION OF NETWORK SERVICES**

- 4.1 As and from the 7 January 2019 and thereafter, continuously until 3 months following the expiry or termination of the Contract) the Contractor will procure the provisioning, availability, and supply of such of the Network Services as are required to ensure that the System meets and continues to meet the Service Levels and requirements of this contract.

5. **ACCEPTANCE PROCEDURES AND INTEGRATION TESTS**

- 5.1 The Parties agree that the procedures to be followed in relation to Acceptance are set out in this **clause 5** and the Technical Assurance Plan.
- 5.2 Satisfactory completion of the Contractor's obligations in relation to the supply, delivery, installation, commissioning, integration, testing, and bringing into service of the System will be in a number stages set out in the Technical Assurance Plan.

- 5.3 The Contractor shall certify to TCL in writing before any Acceptance Tests commence that the System or the relevant part of the system is ready to undergo the applicable Acceptance Tests. The results of all Acceptance Tests will be made available to TCL on request.
- 5.4 The Acceptance Testing shall test the performance and functionality of the System in meeting TCL's requirements as set against the Specification.
- 5.5 Unless otherwise agreed, the Contractor shall not require any TCL personnel to participate in any Acceptance Tests until the Contractor has fully pre-tested and satisfied itself that the applicable requirements in relation to a particular Acceptance Test can be fully and successfully met. The Contractor shall bear all TCL costs accrued as a result of TCL attendance at any abortive Acceptance Test, unless the Contractor has notified TCL in advance (with a notice period no less than 14 days that a scheduled Acceptance Test has been cancelled).
- 5.6 Acceptance of the System shall not relieve the Contractor from performing its other obligations under this Contract and shall not limit any warranties provided by the Contractor.
- 5.7 TCL shall sign an acceptance certificate, in a form reasonably specified by TCL, for each of the relevant stages no later than ten (10) Business Days from the date by which TCL has been provided with a successful test report, as required under the terms of the Acceptance Procedures, which demonstrates that the Acceptance Tests for that stage have been successfully completed (with the date such information is provided being the "**Completion of ATs Date**"). For the avoidance of doubt, the Contractor and TCL shall agree the testing to be undertaken for each stage and the criteria that constitute a successful test. Following the occurrence of Acceptance in relation to one of the stages, the Parties agree:
- 5.7.1 the date from which Liquidated Damages shall cease to apply is the Completion of ATs Date; and
- 5.7.2 the date from which the Contractor is entitled to invoice TCL for the relevant proportion of the System Price is the Acceptance Date.

6. **DELIVERABLES**

- 6.1 The Contractor shall deliver to TCL the Deliverables during the term of this Contract.
- 6.2 The Contractor shall provide to TCL all Deliverables relating to the development, implementation and provision of the System, the Network Services and the Services in a structured format to be agreed upon with TCL. This will include configuration management so that the Contractor shall record and keep a record of all elements of the System including plans, designs and the Contractor Materials.
- 6.3 The Contractor shall maintain all Deliverables such that it remains current with regard to all design, technical, and functionality changes which occur to the System and the Services. The Contractor shall provide to TCL any updates to existing Deliverables made necessary by these changes in a timely manner.

- 6.4 The Contractor shall ensure that all Deliverables supplied under this Contract must be of a reasonable standard of accuracy, presentation and scope and contain such information as to provide adequate and clear instruction to enable suitably qualified and experienced personnel within TCL to make proper use of the facilities and functions, and to operate or maintain the System.
- 6.5 The Parties shall agree upon the medium on which the Deliverables shall be supplied and the Contractor shall provide all issued documents and amendments in that medium.
- 6.6 The Contractor shall define a Deliverables tree structure showing the relationships between each document and shall also define procedures for the control and issue of the Deliverables, including amendments to the Deliverables.
- 6.7 The Contractor shall supply one electronic copy and one hard copy of Deliverables, where appropriate, including drafts for review, if any. The Contractor shall deliver all Deliverables to TCL's Project Manager for distribution within TCL.
- 6.8 If TCL requires a reasonable number of additional copies of any of the Deliverables which the Contractor needs to obtain from a third party, the Contractor shall obtain such reasonable number of additional copies of such Deliverables within 30 days after TCL's request.
- 6.9 All Deliverables shall be in English.

7. SERVICES, REGULATORY CONTROL

- 7.1 As and from the Effective Date, the Contractor will supply the Services, including the Training Services, in accordance with the terms of the Specification, Handover and Handback Requirements and the Project Plan.
- 7.2 The Contractor will provide the Services:
- 7.2.1 promptly and diligently in accordance with the Specification and the Project Plan;
 - 7.2.2 following Good Industry Practice as relevant and applicable to the provision of services within the IT and communications industry;
 - 7.2.3 using all due skill and care;
 - 7.2.4 using suitably qualified and trained Contractor Personnel, and without using Sub-Contractors other than the Permitted Sub-Contractors;
 - 7.2.5 in compliance with all relevant approvals, consents, permissions (including any from third parties), applicable laws, rules and regulations from time to time and within the lawful requirements of local and public authorities;
 - 7.2.6 without infringing the Intellectual Property Rights of any third party;
 - 7.2.7 will provide the Services having obtained and maintaining all necessary licences and consents to perform the obligations under the contract;

- 7.2.8 in accordance with ISO 9001 and ISO 14001 quality standards and the standards specified in the Specification; and
- 7.2.9 in all respects, fully in accordance with the Contract.
- 7.3 In supplying the System and in providing the Services, the Contractor shall (taking into account best available techniques not entailing excessive cost and the best practicable means of preventing, or counteracting the effects of any noise or vibration) have appropriate regard (insofar as the Contractor's activities may impact on the environment) to the need to preserve and protect the environment and to the need to avoid, remedy and mitigate any adverse effects on the environment. The Contractor will also comply at all times with the health, safety and environmental considerations.
- 7.4 The Contractor undertakes to provide the personnel necessary for the performance of the Services and undertakes and warrants that all Contractor Personnel possess the appropriate skills, qualifications and experience to perform the tasks assigned to them, and that they shall be available at such times as are necessary to perform the Services. The Contractor shall ensure that all Contractor Personnel are in possession of valid work permits if they are non-European Community nationals.
- 7.5 TCL shall, so long as it acts reasonably, be entitled to require any member of the Contractor's Personnel to be immediately removed from carrying out a role in providing the Services if such person is, in TCL's view, incompetent, negligent, or guilty of misconduct. TCL shall not be required to give prior notice of its intentions where it is not practicable for it to do so in all the circumstances. The Contractor shall provide a suitable replacement as soon as reasonably practicable.
- 7.6 Notwithstanding the extent of the Services provided by the Contractor in respect of the System, the Parties hereby agree and declare that it is their intention that TCL will retain final and overall control of the System for the purposes of the Communications Act 2003, regulation by the DTI and by OFCOM and any other applicable legislation.
- 7.7 In addition to the maintenance services specified in the Specification, and for a period of five years from the Effective Date, the Contractor will also provide additional maintenance services on a call off basis at prices calculated on the schedule of rates set out in Schedule 4. The schedule of rates will be indexed in accordance with the provisions of Schedule 4.
8. **CHARGES**
- 8.1 In consideration of, and subject to the due performance of its obligations in this Contract by the Contractor, TCL shall pay the Contractor all charges as set out in, or calculated, in accordance with **Schedule 4**
- 8.2 The Contractor shall invoice TCL in accordance with the procedures set out in this **clause 8** and **Schedule 4** and TCL shall pay the Contractor in accordance with these procedures.
- 8.3 Unless otherwise expressly provided in **Schedule 4** the sums specified in **clause 8.1** and **Schedule 4** is inclusive of all costs and expenses including all packing, transport,

insurance and shipping and all other ancillary and other works and expenses, whether separately or specifically mentioned in the Contract or not.

- 8.4 The Contractor is not entitled to reimbursement for expenses unless such expenses are specified in **Schedule 4** or have been incurred with the prior written consent of TCL, in which case the Contractor shall supply appropriate evidence of expenditure in a form acceptable to the TCL Project Manager.
- 8.5 All sums payable under the Contract exclude VAT (or any similar United Kingdom or European sales tax), unless otherwise stated. VAT, where applicable, shall be shown as a separate charge which shall be paid additionally by TCL at the rate ruling at the tax point (being the date of the invoice).
- 8.6 The Contractor shall submit invoices to the address set out in **Schedule 1**, in accordance with the terms set out in **Schedule 1** and quoting the TCL Account Details. Each invoice shall include a brief description of the milestone reached or the services provided.
- 8.7 In the event of a variation to the Contractor's obligations in accordance with this Contract that involves the payment of additional charges to the Contractor, the Contractor shall identify these as a separate item on the invoices.
- 8.8 Any losses or additional expenses incurred by the Contractor in the correction or re-submission of an invoice shall be at the Contractor's expense.
- 8.9 If a payment claimed by the Contractor in any invoice has been correctly calculated in accordance with **Schedule 4** the invoice shall be approved, and payment shall be made within 30 days of receipt of the invoice.
- 8.10 If any sum payable under this Contract is not paid when due then, without prejudice to a Party's other rights under this Contract, that sum will bear interest from the due date until payment is made in full both before and after any judgment, at two per cent (2%) per annum over the HSBC Bank plc base rate from time to time. The Parties agree that this **clause 8.10** is a substantial remedy for late payment of any sum payable under this Contract in accordance with section 8(2) Late Payment of Commercial Debts (Interest) Act 1998.
- 8.11 If the Charges have not been calculated correctly or if the invoice contains any other error or inadequacy, TCL shall be entitled to withhold the payment in respect of the portion of such invoice that is in dispute and shall notify the Contractor as soon as reasonably practical. For the avoidance of doubt, the portion of the invoice that is not in dispute shall be paid in accordance with the payment terms in this Contract. The Parties shall work together to resolve the error or inadequacy. The Contractor shall submit a revised invoice and if approved by TCL, payment shall be made within 30 days of receipt of the revised invoice.
- 8.12 Payments shall be made by Bank Transfer (Bank Automated Clearance System BACS) or such other method that may be agreed between the Parties from time to time.
- 8.13 Unless otherwise agreed, all payments due under this Contract shall be in Pounds Sterling.

9. **RISK AND TITLE**

- 9.1 The Contractor shall be entitled to issue a certificate (an "**Installation Certificate**") in respect of any Devices, once it has installed such Devices and completed all commissioning and integrated work in respect of such Devices, in accordance with the terms of this Contract. The Installation Certificate shall be in such form as shall have been reasonably agreed between the Parties and shall be issued in accordance with the procedures set out the Technical Assurance Plan. For the avoidance of doubt, issue of an Installation Certificate does not imply Acceptance of any Devices.
- 9.2 Risk in all Devices supplied hereunder and installed on the TCL Premises or at the Track will pass from the Contractor to TCL upon issue of an Installation Certificate in respect of the relevant Device
- 9.3 Title in all Devices shall pass from the Contractor to TCL upon the relevant date of Acceptance.
- 9.4 The Contractor undertakes to deliver to TCL good title to all Devices comprised in the System free from any claims and/or encumbrances whatsoever and TCL shall be entitled to quiet possession of each and every Device.
- 9.5 Any equipment supplied by TCL for use or integration with the System will remain the property of TCL and the Contractor will not require any legal or beneficial interest (or any other rights) in such equipment.
- 9.6 The Contractor will be responsible for and shall indemnify the Indemnified Parties against any damage caused by, or loss to or of any Device or Software caused by the Contractor up to the date of Acceptance.

10. **WARRANTIES**

- 10.1 Without prejudice to any other warranties expressed elsewhere in the Contract or implied by law, the Contractor represents, warrants and undertakes to TCL that throughout the term of this Contract:
- 10.1.1 the Contractor is duly constituted, organised and validly existing under the laws of the country of its incorporation, has full capacity and authority and all necessary consents (including but not limited to, where its procedures so require, the consent of its parent company) to enter into and to perform its obligations under this Contract and that this Contract is executed by a duly authorised representative of the Contractor;
- 10.1.2 the Contractor owns and shall maintain all necessary licences or rights required of the Contractor in performing its obligations under this Contract, and that it is entitled to grant to or procure for TCL all necessary licences or rights required to enable TCL to use the System (both during and after the term of this Contract and including rights for TCL to use the Third Party Software), and such licences or rights shall include all enhancements, improvements or upgrades as may be required;

- 10.1.3 the System will, at the date of delivery, be free from all Viruses, and the Contractor shall use all reasonable endeavours not to introduce any at any time, and the Contractor shall, for so long as it provides the Services, continue to perform such Virus checks as may be required to ensure as far as reasonably practicable that the System remains free from Viruses at all times;
- 10.1.4 all materials, equipment and goods used or supplied by the Contractor in connection with this Contract (including the Devices) shall be sound in quality and design, of satisfactory quality within the meaning of the Sale of Goods Act 1979 (as amended), and in accordance with all requirements as may be set out in the Specification;
- 10.1.5 all elements of the System shall (where applicable) meet, and shall continue to meet throughout the term of this Contract, all relevant type approval requirements under the applicable United Kingdom laws and regulations, and that any failure of any such communications equipment to meet such requirements shall be promptly and fully rectified at the Contractor's expense;
- 10.1.6 the Contractor shall provide the Services in a safe manner and free from any unreasonable or avoidable risk to any person's health and well-being and in an efficient manner;
- 10.1.7 all bug fixes and patches applicable to the System shall be incorporated into the same without undue delay;
- 10.1.8 the Services shall be performed in a timely manner in accordance with the Service Levels;
- 10.1.9 any Source Code delivered pursuant to this Contract (or placed in escrow for the benefit of TCL) shall comprise all materials and documentation necessary to enable a reasonably skilled computer programmer to maintain, amend, adapt, develop, operate or otherwise exploit the software contained within the System;
- 10.1.10 there is no material outstanding litigation, arbitration or other claim or dispute in relation to the Contractor that may have an adverse effect upon the proper fulfilment by the Contractor of its obligations under this Contract;
- 10.1.11 the System and related Services shall be free from defects in materials, workmanship, installation and design;
- 10.1.12 the System shall not have its functionality or performance affected, be made inoperable, or be more difficult to use, by reason of any data related input or processing in or on any part of such software, electronic or magnetic media, hardware or computer system;
- 10.1.13 all Training Services to be provided pursuant to this Contract will provide adequate and clear instructions to enable suitably qualified personnel of TCL to make proper use of and benefit from the facilities and functions of the System;
- 10.1.14 the provision of the Services shall not, unless otherwise agreed via the Change Control Procedure, cause any damage, loss or erosion to, or interfere adversely

with, the compilation, content or structure of any data, database, software or other electronic or magnetic media, hardware or computer system used by, for, or on behalf of TCL in the Operating Environment in which it is used or with which it interfaces or comes into contact;

- 10.1.15 any variations enhancements or actions undertaken by the Contractor in respect of the System shall not affect the Contractor's compliance with these warranties; and
- 10.1.16 all hardware shall comply with EU Directive 73/23/EEC (Low Voltage Directive) and the Electricity at Work Regulations, and where applicable, all EMC Regulations.
- 10.2 Without prejudice to the above representations and warranties, the Contractor shall, to the extent possible, pass to TCL the benefit of any additional guarantee and/or warranty secured from its suppliers in respect of any third party goods or services (including the Third Party Software) supplied by the Contractor.
- 10.3 Each representation and warranty shall be construed as a separate representation or warranty and shall not be limited or restricted by reference to, or reference from, the terms of any other representation or warranty or any other term of the Contract and the Contractor acknowledges and agrees that compliance by it, with the warranties (or any of them) shall not of itself constitute performance of any of its other obligations under this Contract.
- 10.4 TCL represents and warrants to the Contractor that it is duly constituted, organised and validly existing under the laws of England and Wales and has the legal right and full power and authority to execute and deliver, and to exercise its rights and perform its obligations under this Contract.

11. **CONTRACT MANAGEMENT**

- 11.1 Each Party will appoint a Project Manager (and for periods when such Project Manager is sick or on holiday, a deputy). The Project Manager will be the single point of contact for each Party for the overall management of this Contract. Each Party shall direct all notices and commercial communications under this Contract to the other Party's Project Manager unless otherwise agreed.
- 11.2 The Project Managers will have the authority and be given the responsibility to:
 - 11.2.1 represent the appointing Party in relation to this Contract;
 - 11.2.2 monitor the appointing Party's compliance with its obligations under this Contract;
 - 11.2.3 where applicable, co-ordinate any technical aspects arising in respect of a Party's obligations and liaise on the management of such obligations;
 - 11.2.4 give and receive notices under this Contract;
 - 11.2.5 exercise rights and give approvals under this Contract; and

- 11.2.6 appoint a deputy who may perform their respective obligations temporarily, not exceeding a continuous period of more than 15 Business Days.
- 11.3 The Contractor Project Manager shall be named as one of the Key Personnel for the purposes of this Contract.
- 11.4 The Contractor shall promptly inform TCL's Project Manager in writing of any acts or omissions on the part of TCL which prevents or hinders, or may prevent or hinder, the Contractor from meeting any of its obligations under this Contract.
- 11.5 The Contractor shall be responsible for producing the reports and other information detailed in **Schedule 13** at the times and in the format stated in that Schedule.
- 11.6 The Project Managers and other representatives of the Parties shall meet throughout the term of this Contract as specified in **Schedule 13** or else meet as reasonably requested by either Party to discuss progress and the delivery of Services in relation to the Project Plan and otherwise to monitor performance of this Contract and the Devices. The Contractor Project Manager shall keep the TCL Project Manager properly and promptly informed in relation to any deviations thereto. The Parties' Project Managers may also discuss such other issues regarding the provision of the Services as may be appropriate to ensure the effective on-going management of this Contract.
- 11.7 Minutes of these meetings shall be taken by the Contractor and sent to TCL within five (5) Business Days of the meeting for TCL's approval, which shall not be unreasonably withheld. Only minutes so approved shall be treated by the Parties as evidence of proceedings at such meetings. The minutes shall clearly set out any actions to be taken, the Party responsible for undertaking such action and the date by which any action must be undertaken.
- 11.8 The Parties acknowledge that this Contract may only be changed in accordance with the Change Control Procedure and any decisions or items within the minutes of meetings attended by the Project Managers that may be stated or implied to be variations to the Contract will not vary the Contract unless made in accordance with the Change Control Procedure.

12. **KEY PERSONNEL**

- 12.1 The Contractor shall at all times throughout the term of this Contract provide appropriately trained and experienced individuals who are reasonably acceptable to TCL to occupy the Key Personnel positions. The Contractor shall provide to TCL details of such persons' proposed roles and responsibilities in relation to the Services and copies of such persons' CV's (which TCL acknowledges may be anonymised in order to comply with the Data Protection Legislation), for TCL's review and approval, prior to such person's appointment as one of the Key Personnel, such approval not to be unreasonably withheld or delayed. Key Personnel shall include personnel of any of the Contractor's Permitted Sub-Contractors where such personnel are identified as critical to the performance of the obligations of the Contractor under this Contract.
- 12.2 The Contractor shall maintain the continuity of its Key Personnel whilst those Key Personnel are in its employ (whether as employees, contractors or otherwise), unless

such Key Personnel are unable to continue performing the Contractor's obligations under this Contract for reasons of poor health, holidays properly taken in accordance with their contractual entitlement or termination of employment, provided always that the Contractor shall ensure that any replacement of its Key Personnel is of the same or better qualification, experience and status as his/her predecessor to enable him or her properly to fulfil his or her responsibilities and that TCL has the right to reject (acting reasonably) such replacement's appointment as one of the Key Personnel.

- 12.3 Key Personnel employed by the Contractor will not be released for any other project then being carried out by the Contractor if any element of the Contractor's obligations under this Contract in which they are involved is still uncompleted and that person's presence is substantially relevant to the completion of such work and the work cannot, in the reasonable opinion of the Contractor, be satisfactorily completed by a replacement.
- 12.4 In the event that any person named as one of the Key Personnel is replaced for any reason, then the Contractor shall:
- 12.4.1 manage a handover, at its cost, during which the successor is fully briefed on the project and the roles and responsibilities which have been undertaken by the replaced Key Personnel member and those to be undertaken;
 - 12.4.2 if required by TCL, agree with TCL a mechanism for demonstrating to TCL, to TCL's reasonable satisfaction, that the Contractor has performed its obligation set out in **clause 12.4.1**; and
 - 12.4.3 allow TCL to reject the new appointee if, during the handover period, TCL determines (acting reasonably) that the new appointee's performance is not sufficient for the success of the project, in which event, the Contractor shall appoint a new replacement person as soon as reasonably practicable, in respect of whom a handover shall be completed to TCL's reasonable satisfaction.

13. **SUB-CONTRACTING**

- 13.1 The Contractor shall not sub-contract all or any part of its obligations under this Contract (other than to the Permitted Sub-contractors) without the prior written consent of TCL, such consent shall not to be unreasonably withheld or delayed. Where any obligation is sub-contracted to a Permitted Sub-contractor, the Permitted Sub-contractor shall be entitled to take the full benefit of any indemnity that has been provided to the Contractor by TCL.
- 13.2 The Contractor shall be TCL's sole point of contact regarding all and any services provided by any Sub-contractor and where the Contractor sub-contracts any part of its obligations under this Contract to a third party, the Contractor shall:
- 13.2.1 be responsible for all payments to that third party; and
 - 13.2.2 ensure that such sub-contract contains obligations no less onerous than those contained in this Contract in respect of confidentiality, security, data protection, intellectual property, freedom of information and sub-contracting as well as the ability for such contract to be assigned or novated in accordance with the provisions of **clause 40.3**.

13.3 The appointment of a Sub-contractor shall not relieve the Contractor from any liability under this Contract and the Contractor shall remain solely responsible and liable to TCL for any breach of the Contract or any performance, non-performance, or part-performance of any of its obligations under this Contract by any Sub-contractor to the same extent as if such breach, performance, non-performance, or part-performance had been carried out by the Contractor.

14. **CONFLICT OF INTEREST**

14.1 The Contractor acknowledges and agrees that it does not and will not have an interest in any matter where there is or is reasonably likely to be a conflict of interest with the performance of its obligations under this Contract and that (except as provided below) it shall not act for any person, organisation or company where there is or is reasonably likely to be a conflict of interest with the performance of its obligations under this Contract. This clause shall not prevent the Contractor from providing services to an existing client of the Contractor to whom the Contractor is currently providing services provided that the Contractor shall:

14.1.1 not act for any such client in respect of any transactions between a member of the TfL Group and such client;

14.1.2 ensure that the personnel acting in any capacity for any such client are different from the personnel involved in the performance of its obligations under this Contract or in any other work which the Contractor carries out in relation to TCL;

14.1.3 ensure that any personnel acting for any such client do not have access to information held by the Contractor relating to TCL; and

14.1.4 inform TCL of all such existing clients and the steps that it is taking to ensure compliance with **clauses 14.1.1 to 14.1.3**

14.2 The Contractor shall undertake ongoing and regular conflict of interest checks throughout the term of this Contract in any event not less than once in every six months and shall notify TCL in writing immediately on becoming aware of any actual or potential conflict of interest arising under this Contract. Breach of **clause 14.1** shall be an irremediable breach of this Contract under **clause 34.1.1** and entitles TCL, forthwith, to terminate this Contract and any other contracts between the Contractor and TCL.

15. **ACCESS TO TCL PREMISES**

15.1 TCL shall grant access for the Contractor Personnel to such TCL Premises as is reasonably necessary for the performance by the Contractor of its obligations hereunder, subject to the Contractor Personnel providing at least 5 Business Days' notice of the requirement and complying with the applicable TfL Policies, subject to such TfL Policies having been provided to the Contractor in advance, in accordance with **clause 15.5**. The Contractor shall, when accessing the TCL Premises ensure that the Tram operator is not prejudiced from its ability to operate on the Track.

15.2 In the event that such Contractor Personnel do not comply in all material respects with the TCL Policies and security requirements, TCL hereby reserves the right, exercisable in its sole discretion, to refuse any or all such access.

- 15.3 If Contractor Personnel are required to work at any TCL Premises, TCL shall, provided that the Contractor has notified TCL suitably in advance, be responsible for procuring that such Contractor Personnel are provided without charge with:
- 15.3.1 electric power and lighting reasonably needed by the Contractor Personnel for the performance of the Contractor's obligations under this Contract; and
 - 15.3.2 to the extent such Contractor Personnel need to work at the TCL Premises, office space suitable for this purpose.
- 15.4 Access to any TCL Premises made available to the Contractor Personnel in connection with this Contract shall be free of charge and shall be used by the Contractor Personnel solely for the purpose of performing the Contractor's obligations under this Contract to:
- 15.4.1 supply and install the System and provide the Network Services; and
 - 15.4.2 provide the Services
- and in any event only to the extent reasonably required. The Contractor shall have the use of such TCL Premises as licensee only.
- 15.5 TCL is responsible for maintaining the security of TCL Premises in accordance with its standard security requirements. The Contractor shall comply with all applicable TCL policies, subject to such policies having been provided to the Contractor in advance, including those relating to safety, security, business ethics, work place harassment, drugs and alcohol and any other on-site working at TCL Premises or accessing of TCL's computer systems (together the "**TfL Policies**" and which includes the Cyber Security Policy and the Health Safety and Environmental Considerations), and shall ensure that all of its personnel comply with such requirements. TCL shall provide the Contractor with copies of the TfL Policies within a reasonable time in advance of the date that they are to be adopted by the Contractor.
- 15.6 If compliance with any change made to a TfL Policy after the date of this Contract will result in the Contractor taking steps which would not otherwise be required of it pursuant to the terms of this Contract (including, but not limited to, pursuant to **clause 17**) and which will result in the Contractor incurring additional and material costs then the Contractor shall submit a proposed change paper to TCL in accordance with **Schedule 9** promptly upon being first informed of the change to the TfL Policy, which notice shall clearly identify the part or parts of the TfL Policy ("**the CCN Elements**") compliance with which will cause the Contractor to incur such additional material costs. Upon TCL's receipt of the proposed change paper the Contractor shall be alleviated of its obligation to comply with the CCN Elements pending agreement between the Parties as to whether or not the CCN Element will be required. If the CCN Element is required then the Parties shall follow the Change Control Procedure in respect of such changes.
- 15.7 Without prejudice to **clause 15.2**, the TCL Project Manager reserves the right under this Contract to instruct any of the Contractor's Personnel to leave any TCL Premises at any time if such person has been negligent, incompetent or committed gross misconduct for any reason and the Contractor will ensure that any such person shall comply with such instructions immediately.

- 15.8 The Contractor shall at all times co-operate and co-ordinate with the party in control of the TCL Premises and shall not cause any damage or destruction to any TCL Premises, subject to fair wear and tear.
- 15.9 TCL shall provide identity cards or entry permits for the Contractor Personnel which shall be displayed by such personnel whilst on the TCL Premises; and the Contractor shall surrender all applicable cards or permits to TCL upon any Contractor Personnel ceasing to be involved in the performance of the Contractor's obligations under this Contract or upon the termination or expiry of this Contract, whichever is the earlier.
- 15.10 TCL reserves the right to request identification of the Contractor Personnel and conduct random security checks of the Contractor Personnel's possessions and vehicle(s) whilst on the TCL Premises.

16. **ELECTRICAL SAFETY**

Testing of the System shall, where applicable, include issue by the Contractor of signed electrical safety test certificates at installation verification. It shall be the responsibility of the Contractor to ensure that all mains powered equipment is tested before Acceptance for compliance with the Electricity at Work Regulations and such equipment shall be suitably labelled, and the results tabled on one signed document giving the equipment type, serial number, measurement details and pass or fail indication.

17. **COMPLIANCE WITH LAW**

- 17.1 The Contractor shall notify the Contractor Personnel and TCL of any health and safety hazards that either (a) may, within the reasonable contemplation of the Contractor, arise; or (b) exist, in connection with the supply, installation or operation or performance of the System and/or the Services and shall fully co-operate with TCL and any others as reasonably necessary to ensure that all reasonably foreseeable risks to health and safety (including fire) are eliminated or adequately controlled.
- 17.2 The Contractor shall perform its obligations under this Contract in compliance with all the requirements of any Act of Parliament, statutory instrument or order or any other regulation having the force of law or bye-law and all regulatory requirements relevant to the Contractor's business and/or TCL's business (together the "Laws"), from time to time in force which are or may become applicable to the performance of such obligations.
- 17.3 In all cases, the costs of compliance with **clause 17.2** shall be borne by the Contractor.
- 17.4 Without limiting the generality of **clause 17.2**, the Contractor shall not unlawfully discriminate, and shall procure that its personnel do not unlawfully discriminate, within the meaning and scope of the Sex Discrimination Act 1975, Race Relations Act 1976, the Disability Discrimination Act 1995 and section 404(2) of the Greater London Authority Act 1999.
- 17.5 The Contractor acknowledges that TCL is under a duty under section 71 of the Race Relations Act 1976 to have due regard to the need to eliminate unlawful racial discrimination and to promote equality of opportunity and good relations between persons of different racial groups. In carrying out its obligations under this Contract, the Contractor shall assist and co-operate with TCL where possible in satisfying this duty.

- 17.6 The Contractor acknowledges that TCL is under a duty by virtue of a direction under section 404(2) of the Greater London Authority Act 1999 to have due regard to the need to:
- 17.6.1 promote equality of opportunity for all persons irrespective their race, sex, disability, age, sexual orientation or religion;
 - 17.6.2 eliminate unlawful discrimination; and
 - 17.6.3 promote good relations between persons of different racial groups, religious beliefs and sexual orientation

and in carrying out its obligations under this Contract, the Contractor shall assist and cooperate with TCL where possible in satisfying this duty.

- 17.7 The Contractor shall comply with all applicable environmental legislation and adopt good practice in relation to managing all environmental issues and requirements ensuing out of the performance of its obligations under this Contract. The Contractor acknowledges that it is to perform its obligations under this Contract alongside and in conjunction with TCL's and the Tram operator's existing ongoing operations which must continue on an uninterrupted basis. The Contractor shall take all reasonable steps to perform its obligations in such a way that limits nuisance to TCL's and the Tram operator's existing ongoing operations resulting from pollution, noise and other results of the performance of the obligations of the Contractor.

- 17.8 The Contractor shall be the Principal Contractor and Principal Designer in relation to the Services for the purpose of the Construction, Design and Management Regulations 2015 ("CDMR").

- 17.9 The Contractor shall maintain a Health and Safety file as required pursuant to the Construction Design and Management Regulations 2015 including, without limitation, details of accidents, training of staff in health and safety matters and any other health and safety issues which may arise. The Contractor shall make the health and safety file available to TCL for inspection at any reasonable time upon receipt of reasonable notice.

18. **CORRUPT GIFTS AND PAYMENT OF COMMISSION**

- 18.1 The Contractor shall not, and shall ensure that its Sub-contractors do not, pay any commission, fees or grant any rebates to any employee, officer or agent of TCL, nor favour any employee, officer or agent of TCL with gifts or entertainment of significant cost or value, nor enter into any business arrangement with employees, officers or agents of TCL, other than as a representative of TCL, without TCL's prior written approval.
- 18.2 TCL has the right to audit any and all such records necessary to confirm compliance with **clause 18.1** at any time during the term of this Contract and during the three year period following expiry or termination of the Contract. Breach of **clause 18.1** shall entitle TCL forthwith to terminate this Contract and any other contracts between the Contractor and TCL.

19. **EQUIPMENT AND MATERIALS**

- 19.1 Subject to **clause 9.2** all equipment and materials used by the Contractor in the performance of its obligations under this Contract shall be at the risk and in the sole charge of the Contractor (regardless of whether or not such equipment and materials are located at TCL Premises).
- 19.2 Without prejudice to its obligations under the provisions of **clause 15**, the Contractor shall ensure that all such equipment and materials meet minimum safety standards required by law, and shall remove all equipment and materials which it brings to TCL Premises on termination or expiry of this Contract or an applicable part thereof for which such equipment and materials are used, or otherwise upon request by TCL.

20. **ESCROW**

- 20.1 The Contractor shall, when implementing any Software (other than any Third Party Software) as part of the System or the Services, and when instructed by TCL or in any event within 30 days of Acceptance of the relevant Software, deposit the Source Code for such Software with the NCC and enter into an escrow agreement with the NCC in respect of that Software, such agreement to name TCL as the relevant beneficiary thereunder. This obligation shall apply to all upgrades and new releases of the Software utilised in connection with this Contract and the Contractor shall deposit the Source Code in respect of any such upgrades and new releases with the NCC promptly following such upgrades and/or new releases being utilised.
- 20.2 With respect to any Third Party Software which is incorporated within the System, or utilised in the performance by the Contractor of its obligations under this Contract, the Contractor shall, when instructed by TCL and in any event within 30 days of Acceptance of the relevant software, use its reasonable endeavours to procure that the owner of such software enters, into an escrow agreement with the NCC for the deposit of the Source Code of that Third Party Software, such agreement to name TCL as the relevant beneficiary thereunder. This obligation shall apply to all upgrades and new releases of the Third Party Software utilised in connection with this Contract and the Contractor shall use its reasonable endeavours to ensure that the Source Code in respect of any such upgrades and new releases is deposited with the NCC promptly following such upgrades and/or new releases being utilised.
- 20.3 The charges payable to the NCC under **clauses 20.1** and **20.2** shall be borne by the Contractor, unless expressly agreed otherwise by TCL.
- 20.4 The Contractor shall ensure that at any point in time during the term of this Contract, the Contractor has within the previous twelve (12) calendar months delivered to the NCC a replacement copy of, or updates to, the Source Code to ensure that the Source Code deposited with the NCC is capable of generating the latest version of the Software used by the Contractor (including all patches and bug fixes).
- 20.5 The Contractor shall, as minimum, ensure that the escrow agreements referred to in **clauses 20.1** and **20.2** provide that the relevant Source Code is released to TCL if this contract terminates or the Contractor is subject to an insolvency event as detailed in **clause 34.1.3**.

21. **QUALITY ASSURANCE AND BEST VALUE**

21.1 The Contractor acknowledges that TfL is a best value authority for the purposes of the Local Government Act 1999 and as such TfL is required to make arrangements to secure continuous improvement in the way it exercises its functions, having regard to a combination of economy, efficiency and effectiveness and, as such, the Contractor shall, where reasonably requested by the TfL, participate in any relevant best value review.

21.2 The Contractor shall assist TfL and/or TCL to discharge TfL's best value duty where possible, including by way of identifying and applying proven techniques and tools from other customers of the Contractor (to the extent that the Contractor is not restricted from doing so either because of confidentiality or intellectual property ownership) that would benefit TCL in connection with this Contract, and implementing practices and procedures designed to ensure that the Contractor performs its obligations in accordance with the terms of this Contract. Having regard to that objective, the Contractor shall provide a quality assurance plan to TCL within four (4) weeks of the Effective Date. The Contractor further acknowledges that this is a key aspect of the partnering arrangement between the Parties.

22. **NON-SOLICITATION**

22.1 Neither Party during the term of this Contract shall directly or indirectly solicit the other Party's personnel who have been employed or engaged in the performance of this Contract. However, this restriction will not apply after the employee has ceased to be employed or engaged in the provision of the performance of a Party's obligations under this Contract for a continuous period of six months. For the purposes of this **clause 22**, "**solicit**" means the soliciting of such person with a view to engaging such person as an employee, director, sub-contractor or independent contractor.

22.2 This **clause 22** shall not apply to restrict either Party from employing (or offering to employ) any personnel of the other Party who have responded to general recruitment advertising.

23. **RECORDS, AUDIT AND INSPECTION**

23.1 The Contractor shall, and shall procure that any Permitted Sub-contractors maintain a complete and correct set of records pertaining to all activities relating to the performance by the Contractor and its Sub-contractors of the Contractor's obligations under this Contract including all transactions entered into by the Contractor for the purposes of this Contract, and in connection with all invoices submitted to TCL and the payments made by TCL under this Contract. The Contractor shall and shall procure that its Sub-contractors retain all such records for a period of no less than seven years (or such other period as may be required by law), except Records containing Personal Data which shall only be retained for as long as necessary, following termination or expiry of this Contract.

23.2 TCL has the right to audit any and all such records at any time, subject to providing notice of no less than five (5) Business Days, whilst this Contract is in force and during the seven year period (or such other period as may be required by law) following termination or expiry of this Contract.

- 23.3 The Contractor shall allow TCL authorised representatives, at any reasonable time, to undertake any inspection, audit or check of any aspect of the Contractor's performance of the Contractor's obligations under this Contract, including, but not limited to, inspection of the Contractor's technical and organisational security measures for the protection of Personal Data, as required by **clause 44**. TCL shall give the Contractor reasonable notice, in writing, of its intention to undertake an inspection, audit or check under this clause.
- 23.4 The Contractor shall provide TCL with all reasonable co-operation in relation to any inspection, audit or check including:
- 23.4.1 granting access to any premises, equipment, plant, machinery or systems used in the Contractor's performance of this Contract, and where such premises, equipment, plant, machinery or systems are not the Contractor's own, using reasonable endeavours to procure such access;
 - 23.4.2 ensuring that appropriate security systems are in place to prevent unauthorised access to, extraction of and/or alteration to data during the audit;
 - 23.4.3 making any information relating to the performance of the Contract available for inspection and providing copies of such information if requested; and
 - 23.4.4 providing a reasonable number of copies of any contracts, other documents or records referred to in this **clause 23** required by the auditor and/or granting copying facilities to the auditor for the purposes of making such copies.
- 23.5 If TCL demonstrates that the Contractor has failed to provide any reasonably required information or that any information previously made available to TCL was to any material degree inaccurate or incomplete, the Contractor shall bear the reasonable costs incurred by TCL in exercising its rights under this **clause 23**.
- 23.6 If any audit reveals any error or incorrect charging in any Contractor invoice, an appropriate correcting payment or credit shall be promptly made by the Contractor together with interest thereon at the base rate for the time being published by the Bank of England and to be applied from the date that such payment was made.
- 23.7 For the purpose of the examination and certification of TCL's accounts, or any examination pursuant to the National Audit Act 1983, of the economy, efficiency and effectiveness with which TCL has used its resources, the Contractor shall allow the Comptroller and Auditor General to examine such documents as he may reasonably require which are owned, held or otherwise within the control of the Contractor, and may require the Contractor to provide such oral and/or written explanations as the Comptroller or Auditor General considers necessary. This clause does not constitute a requirement or agreement for the examination, certification or inspection of the accounts of the Contractor under the National Audit Act 1983.
24. **LIQUIDATED DAMAGES**
- 24.1 The Contractor acknowledges and accepts that it is critical and material to TCL's strategic, commercial and financial interests that the Contractor completes its obligations in relation

to achieving Acceptance by the Planned Acceptance Dates and meets the Service Levels. Therefore:

24.1.1 subject to **clause 3.5**, if the Contractor fails to achieve Acceptance by a Final Acceptance Date, it shall pay to TCL Liquidated Damages at the rate of £380 (three hundred and eighty pounds sterling) for every day which elapses between the Planned Final Acceptance Date and the date on which Final Acceptance Occurs (the "LD Period"); and

24.1.2 if the Contractor fails to meet the Service Levels, it shall pay TCL the LDs at the rate of £760 (seven hundred and sixty pounds) each day

provided always that the amount of LDs payable under this clause 24.1 shall not in any event exceed 10% of the Charges payable under this Agreement.

24.2 All sums payable by the Contractor to TCL pursuant to **clause 24.1.1** shall be paid as Liquidated Damages for delay and not as a penalty, and the Parties acknowledge that such amounts are a genuine attempt to pre-estimate the loss that shall be suffered by TCL in the event of any such failure in achieving Acceptance by the relevant Final Acceptance Date. Any cost implications of any change in Law from Laws applying at the Effective Date will be dealt with under the change control procedure in **clause 25**.

24.3 TCL may:

24.3.1 deduct and retain the amount of any Liquidated Damages becoming due under the provisions of **24.1** from any sums due or which become due to the Contractor under this Contract; or

24.3.2 require the Contractor to pay such amounts to TCL, in which event the Contractor shall pay such amounts within 30 days of receipt of a notice requiring payment.

24.4 The Parties agree that:

24.4.1 the right of TCL to any LDs shall be without prejudice to any other right(s) that TCL may have, including the right to sue for damages or other relief and/or terminate, and for the avoidance of doubt, the payment of LDs shall not be in full and final settlement of any claim or action. If TCL is entitled to payment of any sum (including damages) by the Contractor in respect of an act or omission which gave rise to LDs, the relevant LDs shall be deemed to be part discharge of that sum.

24.5 Subject to **clause 24.4**, payment of Liquidated Damages and Service Credits in accordance with this **clause 24** shall not relieve the Contractor from its obligations to meet the Final Acceptance Date or to meet the Service Levels and are without prejudice to TCL's right to terminate this Contract. Except as detailed in **clause 24.4.1** TCL is not prevented from exercising any of its other rights under this Contract, or to claim general damages at law, including where the Contractor continues in its failure to meet the Final Acceptance Date for a period in excess of the LD Period.

24.6 The Parties agree that TCL shall have a right to terminate this Contract, immediately on written notice to the Contractor, if acceptance is not achieved within 20 weeks of the Planned Final Acceptance Date.

25. **CHANGE CONTROL AND CONTRACT VARIATION**

25.1 This Contract may only be varied or amended with the written agreement of both Parties in accordance with the form set out in **Schedule 9**. Until a change has been made in accordance with the Change Control Procedure, the Contractor shall continue to perform this Contract as if the request or recommendation had not been made.

26. **SET-OFF**

Whenever under this Contract, any sum of money shall be recoverable from or payable by TCL, the same may be deducted from any sum then due or which any time thereafter may become due to TCL under this Contract. The exercise by TCL of its rights under this clause shall be without prejudice to any other rights or remedies available to TCL under this Contract or otherwise howsoever, at law or in equity.

27. **LIABILITY**

27.1 Neither Party excludes or limits liability to the other Party for:

27.1.1 death or personal injury caused by that Party's negligence; or

27.1.2 any breach of any obligations implied by section 12 of the Sale of Goods Act 1979 or section 2 of the Supply of Goods and Services Act 1982 or section 2(3) of the Consumer Protection Act 1987; or

27.1.3 for fraud (including fraudulent misrepresentation); or

27.1.4 wilful default; or

27.1.5 any other matter in respect of which, as a matter of law, liability cannot be excluded or limited

and the Contractor agrees that it does not exclude or limit its liability to the Indemnified Parties in respect of such acts and/or omissions.

27.2 The Contractor does not exclude, or limit its liability to the Indemnified Parties in any way, in respect of liability pursuant to **clauses 30 and 31**.

27.3 The Contractor is responsible for and shall indemnify the Indemnified Parties, from and against any claims, actions, damage, loss, liability, costs, proceedings and expenses of any kind (including reasonable legal fees) (together "**Losses**") in respect of:

27.3.1 death or personal injury caused by the negligence and/or breach of the terms of this Contract by the Contractor; and

27.3.2 any breach by the Contractor of the terms of **clause 32**; and

27.3.3 any breach by the Contractor of the terms of **clause 30** and/or **clause 31**; and

- 27.3.4 any breach of statutory duty by the Contractor and/or the Contractor Personnel, including any act or omission of the Contractor and/or any Contractor Personnel, which causes any breach by the Indemnified Parties of any of their duties under the Data Protection Legislation or the FOI Act, but only to the extent that the Contractor is acting outside the instructions of TCL; and
- 27.3.5 the Loss of any real or tangible property belonging to an Indemnified Party, caused by an act or omission of the Contractor and/or the Contractor Personnel; and
- 27.3.6 the costs of reconstituting and/or recovering any TCL data that is destroyed, corrupted, degraded or lost as a result of an act or omission of the Contractor and/or the Contractor Personnel (including the costs of employing a third party to reconstitute and/or recover such data). TCL agrees that it shall only employ a third party to reconstitute and/or recover such data if the Contractor has failed to fully reconstitute and/or recover such data within what TCL identifies as a reasonable period from the date the data was destroyed, corrupted, degraded and/or lost (which shall be no longer than five (5) calendar days).
- 27.4 Subject to **clause 27.1** and **clause 27.2**, neither Party shall have liability to the other Party (whether under contract, tort (including negligence), statutory duty or otherwise), for any loss of profit, revenue, contracts, goodwill or anticipated savings (whether direct or indirect) or any consequential or indirect Losses (and the Contractor shall have no liability to the Indemnified Parties in respect of such Losses).
- 27.5 Notwithstanding the provisions of **clause 27.4**, the Parties acknowledge that (without limitation) the following types of losses shall be regarded as direct (and not consequential or indirect) Losses for the purposes of this Contract:
- 27.5.1 direct Losses which TCL may suffer as a result of having to reinstate and/or rectify the Operating Environment, which arise as a result of the Contractor's negligence and/or as a result of any breach by the Contractor of the terms of this Contract;
- 27.5.2 reasonable and documented direct costs of internal and external staff necessitated as a result of the Contractor's default (including but not limited to costs of staff performing or re-performing functions which the Contractor, if properly performing of its obligations in accordance with this Contract, should have performed or provided); and
- 27.5.3 in the case of termination of the Contract by TCL under the provisions of **clause 34.1**, the reasonable direct costs of selecting and negotiating with a Successor Contractor to replace the Contractor

and the Parties agree that this **clause 27.5** shall not operate to exclude any liability of the Contractor to the Indemnified Parties that would not be excluded, other than as a result of this **clause 27.5**

27.6 Subject to the provisions of **clause 27.1**, **clause 27.2** and **clause 27.3** the Contractor's aggregate liability to the Indemnified Parties under this Contract (whether in contract, tort, breach of statutory duty, restitution or otherwise) for any Losses shall be limited:

27.6.1 in respect of Loss to TCL's tangible property, to £10,000,000 (ten million pounds sterling);

27.6.2 in respect of Loss to any tangible property that does not fall within the limitation set out in **clause 27.6.1**, to £10,000,000 (ten million pounds sterling);

27.6.3 where the Loss does not fall within the limitations in either **clause 27.6.1** or **clause 27.6.2**, the sum of £10,000,000 (ten million pounds sterling) or twice the value of the contract, whichever is the greater, shall be payable.

27.7 This **clause 27** shall not affect any entitlement to injunctive relief and/or specific performance.

28. **INSURANCE**

28.1 **Requirement to Maintain**

The Contractor shall:

28.1.1 take out and maintain in force or procure the taking out and maintenance of the Required Insurances, and any other insurances as may be required by law (provided that all such insurances must be effective in each case not later than the date on which the relevant risk commences);

28.1.2 ensure that all its sub-contractors engaged in connection with this Contract shall maintain insurance cover sufficient and appropriate to the requirements of this Contract;

28.1.3 notwithstanding any provision to the contrary in this Contract, at its own cost, ensure that all necessary authorisations as may from time to time be required at law to enable the Required Insurances to be validly procured and/or maintained on behalf of the Contractor and any other party to be insured under a Required Insurance have been obtained and are in full force and effect; and

28.1.4 provide broker certificates of insurance to TCL as proof that the insurances referred to in this clause are in full force and effect.

28.2 **Basis of Cover**

For the avoidance of doubt, the Required Insurances (Third Party (Including Products Liability) Insurance), and the Employers Liability Insurance maintained by the Contractor, shall be maintained on a losses occurring basis throughout and shall be set at:

28.2.1 employer's liability insurance in the sum of not less than £10 million per incident;

28.2.2 a product and products liability insurance in the sum of £3million per occurrence and in the annual aggregate.

28.3 **Obligation on Parties**

The Contractor shall not (and shall use all reasonable endeavours to procure that none of its sub-contractors shall) take any action or fail to take any reasonable action, or (insofar as it is reasonably within its power) permit anything to occur, which would entitle any insurer to refuse to pay any claim under any insurance policy in which it is an insured, a co-insured or additional insured person or noted on the policy.

28.4 **Nature of the Insurances**

28.4.1 The insurances referred to in **clause 28.1.1** shall:

28.4.1.1 name the Contractor as insured with any other insured party each for its separate interests;

28.4.1.2 contain a clause whereby the insurance shall apply to each of the insured parties as if a separate policy had been issued to each of them, other than in the event of exhaustion of the sum insured or the limit of indemnity;

28.4.1.3 provide for 30 days (or such lesser period as is market practice from time to time) prior written notice of their cancellation, non-renewal or amendment to be given to TCL; and

28.4.1.4 in respect of the Physical Damage Policies (as defined in **clause 28.13**) provide for payment of any proceeds to be made by insurers in accordance with **clause 28.13**.

28.4.2 For the avoidance of doubt, the minimum levels of indemnity required in respect of each Required Insurance pursuant to the terms of this Contract shall be maintained by the Contractor so that such levels of indemnity are available at all times and shall not be affected by any insurance claim in respect of a matter unrelated to this Contract.

28.5 **Renewal Certificates**

Renewal certificates in relation to the insurances referred to in **clause 28.1.1** shall be obtained as and when necessary and the Contractor shall use its best endeavours to forward copies to TCL at least 10 Business Days after each renewal date (or such other period as may be market practice from time to time).

28.6 **Breach**

If the Contractor is in breach of **clause 28.1, 28.2, 28.4, 28.5** and/or **28.9**, TCL may pay any premiums required to keep the insurances referred to in **clause 28.1.1** in force or itself procure such insurance and may in either case recover the amount of such premiums, together with any costs incurred in procuring such insurance (including, but not limited to, brokerage and/or any costs of obtaining any associated authorisation

required by law from time to time (notwithstanding any provisions to the contrary in this Contract)) from the Contractor on written demand.

28.7 Notification of Claims

The Contractor shall:

28.7.1 give TCL notification immediately upon becoming aware of any claim, or any event or circumstance which is likely to give rise to a claim, in excess of £20,000 on any of the insurances referred to in **clause 28.1.1** specific to this contract and, as soon as reasonably practicable, provide full details of the event or circumstance giving rise or likely to give rise to the claim;

28.7.2 promptly and diligently deal with all claims received relating to the insurances referred to in **clause 28.1.1** and in accordance with all insurer requirements and recommendations; and

28.8 Limit of Liability

Neither failure to comply nor full compliance with the insurance provisions of this Contract shall limit or relieve the Contractor of its liabilities and obligations under this Contract.

28.9 Premiums

All insurance premiums payable in respect of the insurances referred to in **clause 28.1.1** and the amount of any loss that would otherwise be recoverable under any of such insurances but for the applicable uninsured deductible and/or limit of indemnity in respect of such insurance shall at all times be the responsibility of the Contractor.

28.10 Authority Approval

28.11 The insurances referred to in **clause 28.1.1** shall be effected with insurers of good financial standing.

28.12 Insured Loss

The Contractor shall not pursue any claim against TCL in relation to this Contract to the extent that the Contractor is entitled to recover any losses under any of the insurances to be maintained in accordance with this Contract (or where any such insurance is not maintained, to the extent that the Contractor would have been entitled to recover any losses were such insurance maintained in accordance with the terms of this Contract).

28.13 Reinstatement and Application of Proceeds

All insurance proceeds received under any insurance policies (Material Damage Insurance) (the "**Physical Damage Policies**") shall be applied to repair, reinstate and so replace each part or parts of the Devices in respect of which the proceeds were received so that on completion of such repair, reinstatement or replacement, the Devices shall conform to the provisions of this Contract.

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29. **TCL's DATA**

- 29.1 The Contractor acknowledges TCL's ownership of and right to reserve all Intellectual Property Rights which may subsist in TCL's data. The Contractor shall not delete or remove any copyright notices contained within or relating to TCL's data. The Contractor and TCL shall each take reasonable precautions (having regard to the nature of their other respective obligations under this Contract) to preserve the integrity of TCL's data and to prevent any corruption or loss of TCL's data.
- 29.2 The Contractor shall at all times use its reasonable endeavours to establish and maintain safeguards against the destruction, loss, corruption, alteration or disclosure of TCL's data and information in accordance with Good Industry Practice, including in the case of electronic data in its possession or control, maintaining regular back-ups of such data so that it is able promptly to restore any data that is lost or damaged.
- 29.3 In the event that any of TCL's data is corrupted or lost as a result of any act or omission of the Contractor, the Contractor shall, at its own expense, restore or procure the restoration of such TCL data using the back ups it has maintained. If the Contractor fails, within a reasonable time, to restore or procure the restoration of such data, TCL may itself restore or procure the restoration of such data by using the back up copy and shall be repaid by the Contractor its costs in so doing, such repayment to be in accordance with the provisions of **clause 27.3.6**. Subject to **clause 27.1**, the remedies specified in this **clause 29.3** and **clause 27.3.6** shall be the sole remedies of TCL in respect of any corruption or loss of TCL data arising as a result of any act or omission of the Contractor.

30. **INTELLECTUAL PROPERTY RIGHTS**

- 30.1 As between the Parties, the Intellectual Property Rights in all the TCL System shall remain the property of TCL and nothing in this Contract shall constitute any form of transfer or assignment of such Intellectual Property Rights. The TCL System shall be used by the Contractor solely for the purposes of this Contract and shall not be re-allocated to any other work whatsoever.
- 30.2 Neither the Contractor, nor any Sub-contractor, nor any other person, shall have a lien on any TCL System for any sum due to the Contractor, Sub-contractor or other person and the Contractor shall take all steps to ensure that the title of TCL and the exclusion of any such lien are brought to the notice of all Sub-contractors and other persons dealing with any TCL System.
- 30.3 TCL hereby grants to the Contractor (and its Sub-contractors where necessary) a non-exclusive, non-transferable, royalty-free licence to use all the Intellectual Property Rights in the TCL System as reasonably required by the Contractor to perform its obligations under this Contract. Any such licence is granted for the term of this Contract only and solely to enable the Contractor to comply with its obligations under this Contract.
- 30.4 The Contractor hereby assigns (including by way of future assignment in the case of copyright) with full title guarantee to TCL all worldwide rights, title and interest (whether present, future, vested or contingent), including all Intellectual Property Rights in any TCL Data. Such assignment shall take effect from the date of creation of such TCL Data. The

Contractor shall, and shall procure that all Contractor Personnel acting as consultants and all Sub-contractors engaged hereunder shall, execute all such documents and undertake any and all such acts as TCL may from time-to-time require or consider necessary or desirable in order to vest the rights assigned pursuant to this **clause 30.4** properly in TCL. For the purposes of this **clause 30.4**, "**TCL Data**" shall mean all data that is generated by using the System and all other outputs from the System.

30.5 The Contractor grants, or undertakes to procure the grant, to TCL of a perpetual, irrevocable, transferable, world-wide and royalty-free licence to update, sub-licence (including to all members of the TfL Group and the tram operators), reproduce and/or use all Intellectual Property Rights subsisting in any Software, Devices, Deliverables, the System, the Specification and other deliverables delivered or provided by the Contractor under this Contract, other than the Third Party Software (together the "**Contractor Materials**"), in relation to the use of such Contractor Materials as part of the operation of London Trams. TCL shall be entitled to assign such rights to any nominee or Successor Contractor and to sub-licence such rights to any third party in each case in relation to the use of such Contractor Materials as part of the operation of London Trams.

30.6 The cost of the licence granted under **clause 30.5** shall be incorporated into the Charges and the Contractor is responsible for ensuring that any relevant third parties are paid for the grant of such licence of their Intellectual Property Rights. The licences granted by the Contractor under **clause 30.5** shall take effect from the date on which such Contractor Materials are first delivered to TCL, or first used by the Contractor, to perform its obligations under this Contract, whichever is earlier, without the need for the Parties to effect any further documentation.

30.7 In respect of the Third Party Software, **clause 30.5** shall not apply and the Contractor shall procure that TCL, each member of the TfL Group and each and every third party operator of the London Trams is granted a licence to use the Third Party Software to the extent necessary to enable TCL, each member of the TfL Group and each and every third party operator of the London Trams to use the System as envisaged in this Contract and to benefit from the Services. The cost of such a licence, including any maintenance and support, shall, for the term of this Contract, form part of the Charges.

30.8 The Contractor shall, in respect of each piece of Third Party Software at the date of the termination or expiry of this Contract procure that immediately following that date, TCL either:

30.8.1 is granted a perpetual licence to use that Third Party Software (by the vendor of that Third Party Software) to the extent necessary to enable TCL, each member of the TfL Group and each and every third party operator of the London Trams to use the System and to receive the Services from any Successor Contractor; or

30.8.2 is assigned the benefit of the licence that the Contractor had, prior to the date of the termination or expiry of this Contract, to use that Third Party Software.

Any licence fees payable to the vendor(s) of such Third Party Software in respect of the period after the termination or expiry of the Contract shall be for TCL's account.

30.9 The Parties agrees that the Contractor shall only be entitled to incorporate any Third Party Software into the System if it is listed in **Schedule 12** or if TCL provides its prior written consent to such Third Party Software being incorporated, such consent not to be unreasonably withheld or delayed (and the Parties agree that TCL shall not be acting reasonably if it withholds its consent in relation to Third Party Software that is freely available off-the-shelf on the relevant third party's standard terms of contract).

30.10 Neither Party shall at any time do anything or cause anything to be done that would prejudice the other Party's right, title and interest in any of the Intellectual Property Rights vested in that Party pursuant to this Contract or as otherwise owned by that Party.

31. INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS

31.1 The Contractor shall promptly notify TCL upon becoming aware of an infringement or alleged infringement or potential infringement of any Intellectual Property Rights which affects or may affect the provision or receipt of the Services, or the use of the System, or if any claim or demand is made or action brought for infringement or alleged infringement of any such Intellectual Property Rights.

31.2 The Contractor shall defend, indemnify and hold harmless the Indemnified Parties against all actions, claims, demands, costs, charges or expenses and other liabilities (including legal costs) that arise from or are incurred by reason of any infringement or alleged infringement of any Intellectual Property Rights and/or any third party confidential information in respect of the Services, the Network Services and/or the System and which arise as a result of the Contractor's, any Contractor Personnel's or any Sub-contractor's acts or omissions in connection with this Contract or the delivery of any of the Services.

31.3 TCL shall, at the request of the Contractor, give the Contractor all reasonable assistance for the purpose of contesting any such claim, demand, or action. The Contractor shall reimburse TCL for all costs and expenses (including legal costs) incurred in doing so and/or the Contractor shall at its own expense conduct any litigation and all negotiations arising from such claim, demand or action, provided that TCL may participate in such defence or negotiations to protect its interests or those of the Indemnified Parties.

31.4 In addition to the Contractor's obligation to indemnify the Indemnified Parties and any other rights which TCL may have, if a claim or demand is made or action brought to which **clause 31.1** applies or in the reasonable opinion of the Contractor is likely to be made or brought, or which causes TCL's quiet enjoyment of the Contractor Materials or any part thereof to be disrupted or impaired, the Contractor shall after consultation with TCL, at its own expense, promptly:

31.4.1 use its reasonable efforts to secure the right for the alleged infringing item to continue to be used on terms which are acceptable to TCL; or

31.4.2 if the right provided under **clause 31.4.1** is not available, the Contractor having used its best efforts to secure such right, then the Contractor shall modify, the infringing or alleged infringing item so as to avoid the infringement, provided such modification does not reduce the performance, functionality or quality of the said item and provided that the terms of this Contract shall apply mutatis mutandis to such modified item and such item is Accepted by TCL; or

31.4.3 if such solution cannot be accomplished by the Contractor taking all such steps as are appropriate to achieve such outcome, then the Contractor shall replace such item and substitute an alternative of at least equal performance, functionality and quality.

31.5 If the Contractor does not determine within ten (10) Business Days of a claim being presented to assume the defence of an indemnified claim within the required notice period, or ceases to defend the indemnified claim, TCL shall have the right to defend the claim in such manner as it may deem appropriate, at the cost and expense of the Contractor, including payment of any judgement or award and the costs of settlement or compromise of the claim. In such instance, the Contractor shall promptly reimburse and hold harmless TCL for all such costs and expenses (including legal costs).

32. **CONFIDENTIALITY**

32.1 The Contractor acknowledges that during the term of this Contract it may receive Confidential Information of TCL. The Contractor undertakes that:

32.1.1 it shall receive and/or maintain the Confidential Information of TCL in strictest confidence and it acknowledges that such information is of a proprietary and confidential nature;

32.1.2 it shall not use the Confidential Information of TCL for any purposes whatsoever other than for the proper performance of its obligations under this Contract;

32.1.3 it shall not disclose the Confidential Information of TCL to any third party without the prior written consent of TCL except that the Contractor is entitled to do so to the extent strictly necessary to disclose the Confidential Information:

32.1.3.1 to such of its personnel (including any professional advisers, personnel within the Contractor's Group and personnel within the Permitted Sub-contractors) who need to know the Confidential Information for the performance of the Contractor's obligations under this Contract provided that the Contractor shall be responsible for any breach of its obligations occasioned by any act or omission of such personnel; and

32.1.3.2 to the Contractor's auditors and any other person or body having a legal right or duty to know the Confidential Information in connection with the Contract.

32.2 The Contractor shall inform each of the persons referred to in **clause 32.1.3** to whom the Confidential Information of TCL is disclosed of the restrictions as to use and disclosure of the Confidential Information and shall use all reasonable endeavours to ensure that each of them observe such restrictions.

32.3 Upon the expiry or termination of this Contract for whatever reason, the Contractor shall, at TCL's request, deliver to TCL or if TCL requests, destroy all documents and other materials in its possession, custody or control (or the relevant parts of such materials) that bear or incorporate any part of the Confidential Information of TCL. The obligation to return or destroy the Confidential Information of TCL shall not, however, apply to such

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Confidential Information of TCL as the Contractor further requires to the extent that it needs the same for the provision to TCL by the Contractor of Termination Assistance.

- 32.4 The obligations set out in **clause 32.1** do not apply to any Confidential Information which:
- 32.4.1 the Contractor can show by documentary evidence was already in its lawful possession and at its free disposal before the disclosure to it by TCL; or
 - 32.4.2 is lawfully disclosed to the Contractor without any obligations of confidence, by a third party who, on reasonable enquiry by the recipient, claims to have no obligations of confidence to TCL in respect of it and who imposes no obligations of confidence upon the recipient; or
 - 32.4.3 is or has come into the public domain through no fault of the Contractor; or
 - 32.4.4 is required by law or by order of a court of competent jurisdiction to be disclosed; or
 - 32.4.5 which the Contractor can prove is independently developed by or for it without any access to the Confidential Information of TCL.
- 32.5 The Contractor acknowledges that damages would not be an adequate remedy for any breach of this clause and that (without prejudice to all other remedies which TCL may be entitled to as a matter of law) TCL shall be entitled to the remedies of injunction, specific performance and other equitable relief to enforce the provisions of this clause and no proof of special damages shall be necessary for the enforcement of the provisions of this clause.
- 32.6 The obligations with respect to Confidential Information disclosed under this Contract shall survive termination of this Contract and continue for so long as the information remains confidential.
- 32.7 The Contractor must ensure that, prior to it removing any hardware or other equipment owned by the Contractor, all data including any TCL Personal Data and TCL Confidential Information is permanently deleted from such hardware or equipment.
- 32.8 TCL shall have the same obligations as those imposed on the Contractor under this **clause 32** in respect of those categories of confidential information set out in **Schedule 14** except that TCL may:
- 32.8.1 disclose the Contractor Confidential Information where TCL considers that it is obliged to do so under any of the legislation referred to in **clause 45**;
 - 32.8.2 use the Contractor Confidential Information to the extent necessary to obtain the benefit of the Contractor's performance under this Contract;
 - 32.8.3 disclose the Contractor's Confidential Information to any member of the TfL Group to the extent necessary to benefit from the Services and/or the System (subject to the relevant member of the TfL Group having agreed to be subject to

confidentiality obligations that are no more onerous than those that TCL is subject to under this **clause 32.8**);

32.8.4 disclose such Contractor Confidential Information as may be required to be published in the Official Journal of the European Union; and

32.8.5 upon the expiry or termination of this Contract, for whatever reason, retain and continue to use any and all Contractor Confidential Information as TCL reasonably requires to continue using the System and/or the Contractor Materials. TCL may provide copies of the Contractor Confidential Information to Successor Contractors (such term in this **clause 32.8.5** to include any successor contractors to the Successor Contractor), so long as the Successor Contractor has signed a confidentiality agreement in a form reasonably determined by TCL.

33. **DISPUTE RESOLUTION**

33.1 TCL and the Contractor shall use all reasonable endeavours to negotiate in good faith and settle any dispute or difference that may arise out of or relate to this Contract before resorting to litigation.

33.2 If any such dispute or difference is not settled through discussion between the Parties' Project Managers within a period of 7 Business Days of the date on which the dispute arose the Parties may refer the dispute or difference to a director or chief executive (or equivalent) ("**Senior Personnel**") of each of the Parties for resolution.

33.3 If the dispute or difference is not resolved within 15 Business Days of referral to the Senior Personnel under **clause 33.2**, the Parties shall attempt in good faith to resolve the dispute through entry into a structured mediation or negotiation with the assistance of a mediator. Either Party may give notice to the other Party to commence such process and the Notice shall identify one or more proposed mediators.

33.4 If the Parties are unable to agree on a mediator, or if the agreed mediator is unable or unwilling to act, either Party may apply to the Centre for Effective Dispute Resolution ("**CEDR**") in London to appoint a mediator. The costs of a mediator shall be divided equally between the Parties, unless agreed otherwise in writing by the Parties. Both Parties agree to co-operate fully with such a mediator and to provide such assistance as is necessary to enable the mediator to discharge his duties. All negotiations connected with respect to the dispute shall be conducted in confidence and without prejudice to the rights of the Parties in any future proceedings.

33.5 Where a dispute is referred to mediation under **Clause 33.3**, the Parties will attempt to settle such dispute by mediation in accordance with the model mediation procedures published by CEDR or such other procedures as the mediator may recommend.

33.6 If the Parties reach agreement on the resolution of the dispute or difference, such agreement shall be recorded in writing and once signed by the Parties' authorised representatives, it shall be final and binding on the Parties.

33.7 If the Parties fail to reach agreement within 40 Business Days of the appointment of the mediator, such failure shall be without prejudice to the right of either Party to refer the

dispute or difference to litigation. In addition, failing agreement, either of the Parties may invite the mediator to provide a non-binding opinion in writing as to the merits of the dispute or difference and the rights and obligations of the Parties. Such opinion shall be provided on a without prejudice basis and shall be subject to the confidentiality provisions of this Contract.

- 33.8 Notwithstanding the other provisions of this **clause 33**, where expressly stated under any provision of this Contract that any matter in dispute is to be determined in accordance with expert determination, the following provisions shall apply:
- 33.8.1 either Party may refer such matter for determination to such person (the "Expert") as may be appointed by agreement between the Parties or, in default of agreement, nominated on the application of either Party by the President for the time being of the Institute of Chartered Accountants in England and Wales, within 14 days of the application of either Party;
- 33.8.2 any person to whom a reference is made under **clause 33.8.1** shall act as an expert and not as an arbitrator and shall be entitled to appoint such technical expert or experts as he considers necessary to assist him in determining the matter referred to him. The decision of the Expert (which shall be given by him in writing stating his reasons therefore) shall be final and binding on the Parties;
- 33.8.3 each Party shall provide any Expert with such information as he may reasonably require for the purposes of his determination; if either Party claims any such information to be confidential or commercially sensitive then, provided that in the opinion of the Expert that Party has properly claimed the same as confidential or commercially sensitive, the Expert shall not disclose the same to the other Party or to any third party. The proceedings before the Expert shall be kept confidential and all Information shall be kept confidential by the Expert; and
- 33.8.4 the costs of any Expert (including the costs of any technical expert appointed by him) shall be borne in such proportions as the Expert may determine to be fair and reasonable in all the circumstances or, if no such determination is made by the Expert, by the Parties in equal proportions.
- 33.9 For the avoidance of doubt, the Contractor shall continue to perform its obligations in accordance with the Contract and without delay or disruption while a dispute or disagreement is being resolved pursuant to this **clause 33**
- 33.10 The procedures set out in this **clause 33** are intended to be a guide for the Parties to resolve issues rapidly as they arise and it is not intended that the escalation procedure set out in this clause should be operated inflexibly or so as to prevent an issue being resolved at the most appropriate level as quickly as possible. Accordingly, the Parties may agree that the procedure set out in this **clause 33** shall not apply where a dispute has arisen which both Parties acknowledge to be materially business impacting (each acting reasonably). In such circumstances, the Parties shall escalate the matter internally for resolution as soon as reasonably practicable.

33.11 Notwithstanding the foregoing, nothing in this **clause 33** shall prevent either Party taking action at law where it deems it is necessary to do so in order to protect its Intellectual Property Rights or Confidential Information. The escalation and the dispute resolution procedures described above shall also not prevent a Party from notifying the other Party that it withdraws from the escalation or the dispute resolution procedures for any dispute and intends to commence court proceedings nor will it prevent a Party from exercising its right to terminate this Contract in accordance with the termination provisions contained in **clause 34** or elsewhere in this Contract.

33.12 Neither Party shall be prevented from, or delayed in, seeking any order for specific performance or for interim or final injunctive relief as a result of the provisions of this **clause 33** and **clause 33** shall not apply in respect of any circumstances where such remedies are sought.

34. **TERMINATION**

34.1 Without prejudice to TCL's right to terminate at common law or any other rights arising under this Contract, TCL may terminate this Contract in whole or in part immediately upon giving written notice to the Contractor if:

34.1.1 the Contractor commits any irremediable material breach of the Contract; or

34.1.2 the Contractor commits any material or persistent breach of the Contract, including a breach of the Service Levels, and in the case of such a breach that is capable of remedy fails to remedy that breach within thirty (30) calendar days from the date of a written notice to the Contractor giving details of the breach and requiring it to be remedied; or

34.1.3 the Contractor (for the purposes of this **clause 34.1.3**, the "Insolvent Party") is subject to an insolvency event which includes:

34.1.3.1 the Insolvent Party or its ultimate parent company making any voluntary arrangements with its creditors or becomes subject to an administration order;

34.1.3.2 a receiver, manager, or administrator being appointed over all or part of the business of the Insolvent Party or its ultimate parent company;

34.1.3.3 the Insolvent Party or its ultimate parent company going into liquidation (except for the purposes of a solvent amalgamation, reconstruction or other re-organisation and in such manner as the resulting company agrees to be bound by or assume the Insolvent Party's obligations under this Contract and is fully capable of fulfilling those obligations and provided that the prior written consent of TCL has been obtained);

34.1.3.4 the Insolvent Party or its ultimate parent company ceasing or threatening to cease to carry on its business for any reason or being unable to pay its debts within the meaning of the Insolvency Act 1986; or

- 34.1.3.5 any similar event occurring in relation to the Insolvent Party or its ultimate parent company, under the law of any jurisdiction; or
- 34.1.4 the Contractor is subject to a change of control (as defined by section 416 of the Income and Corporation Taxes Act 1988) and TCL reasonably, considers the change of control to:
 - 34.1.4.1 be prejudicial to (a) TfL's ability to exercise its statutory duties and powers; or (b) the development of the System and/or the provision of the Services; or (c) the financial stability of the Contractor; or
 - 34.1.4.2 result in TCL contracting with an entity that is reasonably considered by public authorities in the United Kingdom and/or by TfL to be an undesirable entity to contract with; or
 - 34.1.4.3 be otherwise unacceptable, having regard to TfL's role as a public body.

The Contractor shall notify TCL, in writing, as soon as reasonably practicable (subject to confidentiality and regulatory obligations, but in any event immediately after the change of control takes place) of any change of control;

- 34.1.5 any one or more of the caps on liability set out in **clause 27.6** has (or have) been reached. Whether or not the cap has been reached shall be determined after having taken into account all valid claims which have arisen and which have been notified by TCL to the Contractor in writing at that time; or
- 34.2 The Contractor shall notify the TCL Project Manager in writing (the "**Late Payment Notice**") if any sum due to the Contractor under **clause 8** is outstanding sixty (60) days from the due date. Subject to the Late Payment Notice having been properly served on the TCL Project Manager by the Contractor, the Contractor shall be entitled to terminate this Contract on twenty (20) days' notice if TCL has not paid any sum due to the Contractor under **clause 8** within ninety (90) days of the due date, unless there is a bona fide dispute in respect of the sum due.

35. CONSEQUENCES OF TERMINATION OR EXPIRY

- 35.1 The termination or expiry of this Contract or any part of the Services (howsoever caused) shall not prejudice nor affect any right of action or remedy which has accrued or shall accrue to either Party.
- 35.2 Upon expiry or termination of this Contract or any part of the Services (howsoever caused), the Contractor shall, at no further cost to TCL:
 - 35.2.1 take immediate steps to bring the Services (or any part) to an end in an orderly manner but with all reasonable speed and economy;
 - 35.2.2 provide all such assistance as TCL reasonably requests to enable TCL or a Successor Contractor to assume responsibility for the maintenance and operation of the System;

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- 35.2.3 return to TCL all equipment belonging to or provided by TCL and the Contractor shall certify that no copies of any data or software provided by TCL has been retained;
- 35.2.4 supply to TCL all relevant materials, documentation, data and information on appropriate magnetic or other media (as may be specified by TCL) necessary for the continued operation of the System; and
- 35.2.5 assign or novate to TCL the benefit of the any licences relating to the use of the system.

36. **FORCE MAJEURE**

36.1 Neither Party shall be deemed to be in breach of this Contract or liable to the other Party in any manner whatsoever for any failure or delay in performing its obligations under this Contract to the extent that such failure or delay is caused by a Force Majeure Event, provided however that any delay by a Sub- Contractor or supplier of the Party so delaying shall not relieve that Party from liability for delay except to the extent where that delay itself results from a Force Majeure Event. Subject to the Party so delayed (the "**Affected Party**") promptly notifying the other Party in writing of the reasons for the delay and the likely duration of such delay, the performance of the Affected Party's obligations shall be suspended during the period that those circumstances persist and the Affected Party shall be granted an extension of time for performance equal to the period of the delay.

36.2 As soon as practicable after the occurrence of a Force Majeure Event:

36.2.1 the Affected Party shall use its reasonable efforts to perform (or recommence performing) its obligations as soon as and to the extent possible, including through the use of alternative sources and/or work-around plans and relief under this **clause 36.2** shall cease to be available to a Party if it fails so to take such steps to remedy the failure;

36.2.2 the Parties shall consult at regular intervals to agree any steps to be taken, and an appropriate timetable in which those steps should be taken, to enable continued provision of the affected obligations under this Contract (on a temporary or permanent basis); and

36.2.3 the Parties shall use their reasonable endeavours to mitigate the effects of such Force Majeure Event.

36.3 Save where a delay is caused by the act or omission of the other Party including, without limitation, a failure to have in place such back up procedures and contingency planning as would reasonably be expected of a prudent operator in the field of information technology services (in which event the rights, remedies and liabilities of the Parties shall be those conferred and imposed by the other terms of this Contract and by law) any costs arising from that delay shall be borne by the Affected Party. In particular, during any period of delay caused by a Force Majeure Event, the Contractor shall only be entitled to receive the Charges in respect of any Services that it continues properly to provide to TCL during that period.

36.4 If a Force Majeure Event causes the Contractor to allocate limited resources between the Contractor's customers, the Contractor shall not place TCL lower in priority to any other similarly affected customer.

36.5 If a Force Majeure Event prevents the Contractor from performing any obligation in this Contract for a period of thirty (30) or more calendar days, then nothing in this Contract shall prevent TCL as an interim measure from sourcing the affected obligations itself or from a third party supplier.

37. **NON-PUBLICITY**

37.1 The Contractor shall not advertise or announce this Contract, or that it is supplying the System, or is providing Services to TCL, without the prior written consent of TCL.

37.2 The Contractor shall not use the name of any member of the Tfl Group nor refer to, nor identify any member of the Tfl Group in publicity releases, promotional or marketing materials, announcements, customer listings, testimonials or advertising. The Contractor acknowledges that this **clause 37** may be breached if, notwithstanding the fact that a code name may be used, the circumstances of facts contained in any such materials by implication identifies any member of the Tfl Group. The text of any press release or other communication to be published by or in the media concerning the subject matter of this Contract shall require the prior written approval of TCL.

37.3 TCL shall be entitled to make reference to this Contract by way of publicity release.

38. **SURVIVAL**

38.1 The provisions of **clauses 9** (Risk and Title), **12** (Key Personnel), **18** (Corrupt Gifts and Payment of Commission), **22** (Non-Solicitation), **23** (Records, Audit and Inspection), **26** (Set-Off), **27** (Liability), **28** (Insurance), **29** (TCL's Data), **30** (Intellectual Property Rights), **31** (Infringement of Intellectual Property Rights), **32** (Confidentiality), **33** (Dispute Resolution), **34** (Termination), **35** (Consequences of Termination or Expiry), **37** (Non-Publicity), **39** (Rights of Third Parties), **41** (Non-Waiver of Rights), **42** (Illegality and Severability), **43** (Notices), **45** (Freedom of Information), **48** (Entire Agreement) and **49** (Governing Law and Jurisdiction), this clause and any other clauses or Schedules that are necessary to give effect to those clauses shall survive termination or expiry of this Contract.

38.2 In addition, any other provision of the Contract which by its nature or implication is required to survive the termination or expiry of this Contract, shall do so.

39. **RIGHTS OF THIRD PARTIES**

39.1 Save that any member of the Tfl Group has the right to enforce the terms of the Contract in accordance with the Contracts (Rights of Third Parties) Act 1999 ("Third Party Act"), the Parties do not intend that any of the terms of the Contract will be enforceable by virtue of the Third Party Act by any person not a party to it.

39.2 Notwithstanding **clause 39.1**, the Parties are entitled to vary or rescind the Contract without the consent of any other person including any member of the Tfl Group.

40. **NOVATION AND ASSIGNMENT**

40.1 TCL may novate or otherwise transfer the Contract (in whole or in part).

40.2 Within 10 Business Days of a written request from TCL, the Contractor shall at its expense execute such agreement as TCL may reasonably require to give effect to any such transfer all or part of its rights and obligations under the Contract to one or more persons nominated by TCL .

40.3 Subject to **Schedule 11**, the Contract is personal to the Contractor who shall not assign the benefit or delegate the burden of the Contract or otherwise transfer any right or obligation under the Contract without the prior written consent of TCL.

41. **NON-WAIVER OF RIGHTS**

41.1 The failure of either Party to insist upon the strict performance of any provision of this Contract, or the failure or delay of either Party to exercise any right or remedy to which it is entitled under this Contract, does not constitute a waiver of such right or remedy and shall not cause a diminution of the obligations established by this Contract.

41.2 No waiver of any of the provisions of this Contract is effective unless it is expressly stated to be a waiver and communicated to the other Party in writing in accordance with the provisions of **clause 43**. The single or partial exercise of any right, power or remedy under this Contract shall not in any circumstances preclude any other or further exercise of it or the exercise of any other such right, power or remedy.

42. **ILLEGALITY AND SEVERABILITY**

If any provision of this Contract (in whole or in part) is held invalid, illegal or unenforceable for any reason by any court of competent jurisdiction, such provision shall be severed from the Contract and the remaining provisions shall continue in full force and effect as if this Contract had been executed without the invalid, illegal, or unenforceable provision. In the event that such a provision is so fundamental as to prevent the accomplishment of the purpose of this Contract, TCL and the Contractor shall immediately commence good faith negotiations to try to remedy such invalidity.

43. **NOTICES**

43.1 Any notices or other documents to be given under this Contract shall be in writing in English and shall be deemed to have been duly given if delivered by hand or by registered post or by facsimile to a Party at the address set out in **Schedule 1** for such Party, or such other UK address as one Party may from time to time designate by written notice to the other.

43.2 In the event of any postal or other strike or industrial action affecting postal communications in the United Kingdom, notices shall be given by hand or sent by facsimile.

43.3 Any such notices or other documents shall be deemed to have been received by the addressee two (2) Business Days following the date of despatch if the notice or other

document is sent by registered post, or on the next Business Day after despatch if given by hand or sent by facsimile.

44. PROTECTION OF PERSONAL DATA

44.1 Each Party shall fully comply with all of its obligations under Data Protection Legislation. The Contractor shall not by any act or omission place TCL in breach of the Data Protection Legislation and, if Processing Personal Data on behalf of TCL ("**TCL Personal Data**"), the Contractor shall only act in accordance with reasonable instructions from TCL.

44.2 The Contractor shall take appropriate technical and organisational security measures that are reasonably required by TCL against the unauthorised or unlawful Processing of TCL Personal Data and against the accidental loss, destruction of, or damage to such TCL Personal Data.

44.3 The Contractor shall:

44.3.1 ensure the reliability of the Contractor Personnel having access to TCL Personal Data and shall ensure that such Contractor Personnel are fully aware of the measures to be taken when Processing TCL Personal Data;

44.3.2 ensure that TCL Personal Data is kept separate from Contractor personal data and from personal data belonging to other customers of the Contractor;

44.3.3 ensure that TCL Personal Data is only accessed by authorised Contractor Personnel;

44.3.4 provide TCL with such co-operation, assistance and information as is reasonably required by TCL to comply with its obligations under the Data Protection Legislation;

44.3.5 at any time at TCL's reasonable request, submit to TCL all required materials and/or technical documentation to demonstrate its compliance with this **clause 44**; and

44.3.6 not export TCL Personal Data to any country outside the European Economic Area, without TCL's prior written consent.

44.4 When the Contractor receives a written request from TCL for information about, or a copy of, TCL Personal Data, the Contractor shall supply such information or data to TCL within such time and in such form as specified in the request (such time to be reasonable) or if no period of time is specified in the request, then within ten (10) Business Days from the date of the request.

44.5 TCL remains solely responsible for determining the purposes and manner in which TCL Personal Data is to be processed. The Contractor shall not share any TCL Personal Data with any Sub-contractor or third party unless there is a written contract in place which requires the Sub-contractor or third party to:

44.5.1 only process TCL Personal Data in accordance with TCL's reasonable instructions to the Contractor; and

44.5.2 comply with the same data protection requirements that the Contractor is required to comply with under this Contract.

45. **FREEDOM OF INFORMATION**

45.1 For the purposes of this clause:

45.1.1 "**FOI Legislation**" means the Freedom of Information Act 2000, all regulations made under it and the Environment Information Regulations 1992 and any amendment or re-enactment of any of them; and any guidance or statutory codes of practice issued by the Information Commissioner, the Department of Constitutional Affairs or the Department for Environment Food and Rural Affairs including in each case its successors or assigns) in relation to such legislation;

45.1.2 "**Information**" means information recorded in any form held by TCL or held by the Contractor on behalf of TCL; and

45.1.3 "**Information Request**" means a request for Information under the FOI Legislation.

45.2 The Contractor acknowledges that TCL is subject to the FOI Legislation and agrees to provide reasonable co-operation and assistance to TCL, at no additional cost or charge to TCL, to enable TCL to comply with its obligations under the FOI Legislation relevant to this Contract.

45.3 Without prejudice to the generality of **clause 45.2**, the Contractor shall and shall procure that its Sub-contractors shall:

45.3.1 transfer to the TCL Project Manager (or such other person as may be notified by TCL to the Contractor) all Information Requests that they receive as soon as practicable and in any event within 2 Business Days of receiving an Information Request; and

45.3.2 in relation to Information held by the Contractor on behalf of TCL, provide TCL with details about and/or a copy of all such Information that TCL requests and such Information shall be provided within 5 Business Days of a request from TCL (or such other period as TCL may reasonably specify), and in such form as TCL may reasonably specify.

45.4 TCL shall be responsible for determining whether Information is exempt information under the FOI Legislation and for determining what Information will be disclosed in response to an Information Request in accordance with the FOI Legislation. The Contractor shall not itself respond to any person making an Information Request, save to acknowledge receipt, unless expressly authorised to do so by TCL.

45.5 The Contractor acknowledges that TCL may be obliged under the FOI Legislation to disclose Information without consulting or obtaining consent from the Contractor, provided that TCL shall use reasonable endeavours to consult with the Contractor prior to disclosing any Contractor Confidential Information.

45.6 This **clause 45** shall survive the expiry or termination of this Contract.

46. **RELATIONSHIP OF THE PARTIES**

46.1 Nothing in this Contract constitutes, or shall be deemed to constitute, a partnership between the Parties nor, except as expressly provided, shall either Party be deemed to be the agent of the other nor shall any of the Contractor Personnel be deemed to be employees of TCL.

46.2 Subject to any express provisions to the contrary in this Contract, neither Party has a right or authority to and shall not do any act, enter into any contract, make any representation, give any warranty, incur any liability, assume any obligation, whether express or implied, of any kind on behalf of the other Party or bind the other Party in any way.

47. **DISREPUTE**

47.1 The Contractor shall take all reasonable steps to preserve the reputation and good name of TCL in performing its obligations under this Contract and shall do nothing which would or might diminish the reputation or good name of TCL.

47.2 In the performance of its obligations under this Contract, the Contractor shall not, and shall procure that the Contractor Personnel and/or Sub-contractors do not express any fact, opinion or thought as being the fact, opinion or thought of TCL, unless previously and specifically authorised in writing.

48. **ENTIRE AGREEMENT**

48.1 Subject to **clause 48.3**, this Contract and all documents referred to in this Contract, constitute the whole and only contract between the Parties relating to the subject matter of the Contract and supersede and extinguish any prior drafts, agreements, undertakings, representations, warranties and arrangements of any nature whatsoever, whether or not in writing relating to the provision of the Services. Neither Party has been induced to enter into the Contract by a statement which the Contract does not contain.

48.2 Subject to **clause 48.3** and without prejudice to the Contractor's obligations under this Contract, the Contractor is responsible for and shall make no claim against TCL in respect of any misunderstanding affecting the basis of the Contractor's tender or BAFO in respect of the Contract or any incorrect or incomplete information howsoever obtained.

48.3 Nothing in this Contract excludes any liability for fraudulent misrepresentation.

49. **GOVERNING LAW AND JURISDICTION**

This Contract is governed by and shall be construed in accordance with English Law and without prejudice to the dispute procedure set out in **clause 33**, is subject to the exclusive jurisdiction of the English Courts provided that TCL has the right in its absolute discretion to enforce a judgment and/or to take proceedings in any other jurisdiction in which the Contractor is incorporated or in which any assets of the Contractor may be situated. The Parties agree irrevocably to submit to that jurisdiction.

THE CONTRACT has been signed for and on behalf of the Parties by their duly authorised representatives, on the day and year written above.

SIGNED BY

duly authorised to sign for and on behalf of)
TRAMTRACK CROYDON LIMITED



SIGNED BY

duly authorised to sign for and on behalf of)
ENGINEERING SUPPORT GROUP LIMITED



SECTION 1

SCHEDULE 1

Key Contract Information

1. **Contract Reference Number:** LT-C-17-466
2. **Name of Contractor:** ENGINEERING SUPPORT GROUP LIMITED
3. **Commencement (Effective Date):** The date at the front of this Agreement
4. **Duration/Expiry Date:** Until the Services are delivered
5. **Payment see Clauses 8 and Schedule 4**

Clause 8.6

The Contractor shall submit invoices to the address set out in **Schedule 1**, in accordance with the terms set out in **Schedule 1** and quoting the TCL Account Details. Each invoice shall include a brief description of the milestone reached or the services provided.

Clause 8.9

Where no alternative is listed, payment must be made within 30 days of receipt of invoices.

6. **Address where invoices shall be sent:**



Electronic format required (if any) for submission of orders by the Authority and of invoices by the Contractor:

7. **Time for payment where not 30 days:** N/A

8. **Details of the TCL Project Manager**

Name:



Address: Tramtrack Croydon Limited trading as London Trams, Floor 11, 17 Addiscombe Road, Knollys House, East Croydon, Surrey, CR0 6SR

Tel:



Fax:

Email:

9. **Details of the TCL Procurement Manager**

Name:



Address: Tramtrack Croydon Limited trading as London Trams, Floor 11, 17 Addiscombe Road, Knollys House, East Croydon, Surrey CR0 6SR

Tel: [REDACTED]
Fax: [REDACTED]
Email: [REDACTED]

10. Details of the Cyber Security team

Email: [REDACTED]
Phone: [REDACTED]

11. Contractor's Key Personnel:

Name & Position	Contact Details	Area of Responsibility
Contractor Projector Manager	[REDACTED]	Project delivery
Contractor Project Engineer	[REDACTED]	

12. Address for service of notices and other documents in accordance with Clause 43:

For TCL: Attention of the Senior Commercial Manager
11th floor, 17 Addiscombe Road
Knollys House, Croydon
Surrey
CR0 6SR

For the Contractor: [REDACTED]

13. Training to be provided by the Contractor in accordance with Schedule 8 : Training and advice in respect of the use and operation of the Devices as detailed in the Specification and the Handover and Handback Requirements

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SECTION 2

SCHEDULE 2

Employer's Requirements

1. Definitions and Abbreviations

Term used in specification	Definition
Conditional speed location	A location where the over speed protection can dynamically change between at least two values, e.g. based upon the condition of a stop signal or points. Note: this specification requires the capability to manage conditional speed but as a future option.
Endemic failure	When more than 5% of installed PPOS components (line replaceable items) experience the same failure within the warranty period.
Fixed speed location	The over speed value for this location is constant. At this location the over speed limit is fixed and would require reconfiguration to change the speed.
Full service brake	Defined in EN 13452-1 as the maximum available level of service braking. In the context of PPOS this means 'Emergency 1' braking which is also defined in EN 13452-1 as "where the requirement is simply to bring the vehicle to a standstill by any means, irrespective of the position of the traction and brake controls".
Hazard brake	Brake application in emergencies activated by driver operation of the Emergency stop button. Braking provided by the track brake, service brake and provision of sand to the rail head. Standard EN 13452-1 defines this as 'Emergency 3'.
High risk location	A location identified by the Purchaser as needing over speed protection. There will be an area (or distance along the track), with defined boundaries where the over speed limit is to be applied. Boundaries on either side of the high risk area may require unique location identities.
Inbound	The direction heading towards Croydon town center from New Addington, Elmers End, Wimbledon and Beckenham Junction.
Isolation	The 'isolation' function is to be made available to a tram driver allowing the intervention of PPOS to be disabled in cases where the system has a technical fault. Isolation is not reversible without maintenance intervention and when isolated it should be apparent within the driving cab and at the OCC.
iTram	iTram provides the driver with alerts of upcoming hazards and speed restrictions. iTram also provides performance reporting providing post event analysis of speeding events.
Outbound	The direction heading from Croydon town center from to New Addington, Elmers End, Wimbledon and Beckenham Junction.

Over speed	In the context of PPOS, over speed is defined as a speed at which (accounting for measurement accuracy and variable factors) the risk of derailment or over turning increases significantly.
Safety Circuit	The safety circuit that when triggered will invoke full service braking to standstill, i.e. 'Emergency 1' as defined in EN 13452-1.. The PPOS safety relay will interrupt the safety circuit.
SM Guardian	Seeing Machines Guardian provides analysis of driver eyelid movements and by detecting the percentage of closures determines alertness of the driver.
Speeding	Speeding is defined as exceeding the line speed limit at the current location. Note: there is usually a considerable safety margin between speeding and 'over speed'. PPOS is <u>not</u> required to detect or intervene in cases of speeding. Other devices such as OTDR and iTram identify speeding events.
Standstill	To bring the tram to a complete standstill and keep it inoperable (traction disabled, and brake applied) for a period of time allowing the OCC time to contact the driver and decide on next steps.
UKTram	Trade body representing owners and operators of tramways in the UK

2. Glossary of Terms

Abbreviation	Description
BS	British Standards
BOM	Bill of Materials
BTP	British Transport Police
CAPEX	Capital expenditure (covering full scope)
DC	Direct Current
DfT	Department for Transport
DOP	Dilution of Precision
DSD	Drivers Safety Device
EMC	Electromagnetic Compatibility
EN	Euro Norm
FAT	Factory Acceptance Test
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation by Satellite System
ISA	Independent Safety Assessor
iTram	On-tram performance and speed monitoring system
ITT	Invitation To Tender
LED	Light Emitting Diode
LRU	Line Replaceable Unit
LT	London Trams
MCB	Miniature Circuit Breaker
MNO	Mobile Network Operator
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair and Verify
NCSC	National Cyber Security Centre (GCHQ)

NIST	National Institute of Science and Technology (U.S. Department of
NTP	Network Time Protocol
OCC	Operations Control Centre
OEM	Original Equipment Manufacturer
OPEX	Annual operating expenditure to maintain, overhaul, etc. supporting useful life
ORR	Office of Rail and Road
OTDR	On Tram Data Recorder
PPE	Personal Protection Equipment
PPOS	Physical Prevention of Over-speed System
RAIB	Rail Accident Investigation Branch
RFID	Radio Frequency Identification
RoHS	Restriction of Hazardous Substances
RSSB	Rail Safety and Standards Board
SAT	System Acceptance Test
SIL	Safety Integrity Level
TBC	Traction Brake Controller
TfL	Transport for London
TO	Tram Operator
TOL	Tram Operations Limited, First Group; ROGS Transport Undertaking
V	Volts
VMI	Vehicle Maintenance Instructions
WEEE	Waste Electrical and Electronic Equipment
WSP	Wheel Slide Protection

3. Introduction

This specification describes the requirements for the design, supply, assurance, installation, testing and documentation for a Physical Prevention of Over-speed System (PPOS) for the Croydon Tram fleet. The PPOS system is to be installed on the existing tram fleet in response to recommendations made by the Rail Accident Investigation Branch (RAIB).

The term 'shall' is used for mandatory requirements and 'should' for preferred requirements.

Examples cited within this specification are for explanatory purposes only. This specification provides information and guidance in highlighted text boxes beneath some requirement clauses.

It should be noted that LT expect the PPOS system to be of a scalable type permitting limited, localised installation. It is not envisaged that the PPOS system will be of a type requiring network wide implementation.

4. Purpose

The objective of the PPOS is to satisfy Recommendation 3 from RAIB in their report on the Sandilands incident (Report 18/2017: Overturning of a tram at Sandilands junction, Croydon):

"The intent of this recommendation is to prevent serious accidents due to excessive speed at higher risk locations on tramways. These locations are likely to include all locations where a substantial speed reduction is required for trams approaching at relatively high speed. Implementation of this recommendation may be assisted by work in this area already underway by Croydon tramway organisations"

Work already undertaken by LT has identified the following high level objectives for PPOS:

- 4.1.1. PPOS shall be a protection system of 'last resort' supplementary to other speed management initiatives already implemented (trackside signage, driver vigilance system and over speed alert (SM Guardian), and speed monitoring / analysis (iTram));
- 4.1.2. PPOS shall automatically bring a moving tram to a standstill if it exceeds an over speed limit at a designated high risk location. LT recognize that this requirement exceeds that of the RAIB recommendation.

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- 4.1.3. PPOS shall alert the Operations Control Centre (OCC) when an over speed event has occurred;
- 4.1.4. PPOS shall provide the OCC an opportunity to implement operational controls following an over speed event;
- 4.1.5. PPOS shall provide reliable protection without impacting normal service delivery and performance;
- 4.1.6. PPOS shall be simple, cost efficient and permit rapid deployment on trams and tramway infrastructure;
- 4.1.7. PPOS shall be flexible, adaptive and scalable capable of addressing new speed risk hazard locations that may arise in the future anywhere on the tramway infrastructure;
- 4.1.8. PPOS shall include self testing and monitoring capabilities, and shall alert the OCC when PPOS protection is not available.

5. Background Information

5.1. Stakeholder Organisations

London Trams (LT) is a subsidiary of Transport for London Ltd (TfL).

TfL manages LT as part of TfL's Surface Transport organisation, whose other responsibilities include London Overground, Docklands Light Railway and London buses.

LT staff maintains the trams and the infrastructure. Tram operations are subcontracted to Tram Operations Ltd (TOL), part of FirstGroup.

TOL is managed as part of FirstGroup's rail division, sitting alongside main line rail operations. It is responsible for operating the trams to the prescribed timetable and employs operational staff including tram drivers, line controllers and managers.

The Office of Rail and Road (ORR) and its predecessors carried out the assessments, inspections and approvals required before the tramway could be opened for public use, produce and updated guidance applicable to tramways, and regulate safety on national rail and tram networks.

UKTram is the trade body representing owners and operators of tramways in the UK. Responsibility for management of the tramway guidance was passed from ORR to UKTram in 2015.

5.2. Physical Assets

5.2.1. Vehicles

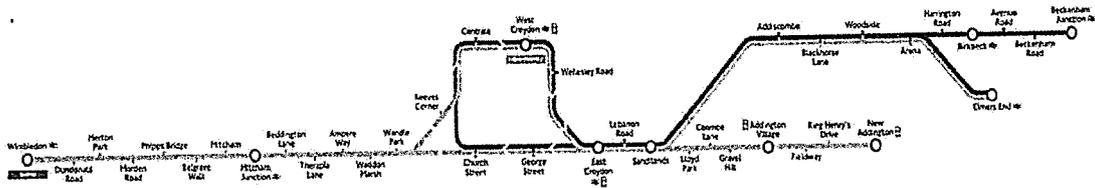
Bombardier Transportation supplied 24 CR4000 trams, which have been used since the tramway opened in May 2000.

Stadler Rail supplied 12 Variobahn trams in two phases.

Manufacturer	Fleet Designation	Description	Vehicle Numbers	Qty
Bombardier	CR4000	1 st phase, built 1998-99	2530-2553	24
Stadler Rail	Variobahn	2 nd phase, built 2012	2554-2559	6
Stadler Rail	Variobahn	3 rd phase, built 2015-16	2560-2565	6
Total				36

5.2.2. Infrastructure

The infrastructure comprises 39 stations over 17 miles. There are approximately 100 changes in speed limit and 54 lineside signaling cabinets.



5.2.3. Operation and Maintenance

The vehicle maintenance depot and system control room is located at Therapia Lane. The depot has sufficient stabling for up to 36 tram sets, and a double track workshop with facilities to perform almost all maintenance activities.

LT are the Design Authority responsible for the Bombardier trams.
 Stadler Rail is the Design Authority for the Stadler trams.

5.3. Vehicle Configuration

Vehicle configuration information is included in the Pre-construction Information section of the documentation.

6. Applicable Standards and Documents

- 6.1.1. The following standards shall apply to PPOS and its component parts. Suppliers are expected to identify and apply all relevant standards.
- 6.1.2. Where applicable, the Supplier shall supply certification as evidence of compliance to all quoted standards and regulations in their tender response.

Title	Reference
The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS)	Office of Road and Rail (ORR)
Health and Safety at Work Act 1974	UK Government
Construction (Design and Management) Regulations 2015 (CDM 2015)	UK Health and Safety Executive
DDA	DDA, 1995
Rail Vehicle Accessibility Regulations	RVAR 2010
EMC	EM55022
Fire Precautions in the Design and Construction of Passenger Carrying Trains	BS6853

<p>CPNI "Security for Industrial Control Systems Framework" good practice guide.</p> <p>IEC 62443 Industrial Communication Networks Network and System Security" series of Standards.</p> <p>Rail Cyber Security – Guidance to Industry" published by the Department for Transport.</p> <p>ISO27001:2013 Information Security Management Systems</p>	Cyber Security best practice
BS EN 61373:2010 Railway applications. Rolling stock equipment. Shock and vibration tests.	European Union
GM/RT2130 Vehicle Fire Safety and Evacuation, RSSB, 2013 [3].	Rail Safety and Standards Board
BS/EN45545 Railway applications. Fire protection on railway vehicles	European Union
BS/EN50155 Railway applications. Electronic Equipment used on Rolling Stock [6].	European Union
BS/EN61373 Rolling stock equipment. Shock and vibration tests BSI 2010 [8].	European Union
IEC61508 Functional Safety Of Electrical/Electronic/Programmable Electronic Safety-Related Systems	European Union
EN50128 Railway Applications. Communication, Signalling and Processing Systems - Software for Railway Control and Protection Systems	European Union
EN50125-1 Railway Applications - Environmental Conditions For Equipment - Part 1: Rolling Stock And On-Board Equipment	European Union
EN50121 Railway Applications - Electromagnetic Compatibility.	European Union
EN50126 Railway Applications - The Specification And Demonstration Of Reliability, Availability, Maintainability And Safety (Rams)	European Union
EN50129 Railway applications. Communication, signaling and processing systems. Safety related electronic systems for signaling	European Union

6.1.3. This change shall be delivered in compliance with the following LT assurance documents:

Title	Detail	Reference
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Change to Rolling Stock	Formal change control requirements for Rolling Stock	LT-IMS-ENG-401 Issue 2
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-Change-000 Managing Change
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-Change-030 Infrastructure, Rolling stock & Systems change
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-Change-037 Change Categorisation and Approvals
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-RISK-000 Managing Risk
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-RISK-040 Modifications Panel
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-RISK-060 Risk Scoring Scheme
	As required by LT-IMS-ENG-401 Issue 2	LT-IMS-RISK-080 Risk Register
Technical Assurance Templates		LT Technical Assurance Templates LT-IMS-ENG-110 issue 1
Master Document List		LT Master Document List LT-IMS-ENG-107
TfL CAD Standard	Computer Aided Design	S 1037
Collaboration/ Production Code of Practice	Production of CAD Design	BS1192

7. Supplier Requirements

7.1. Supplier Accreditation

- 7.1.1. The Supplier shall provide copies of and, at all times during execution of the scope of supply, maintain the following accreditation as applicable:
- ISO 9001 – Quality Management
 - ISO 14001 – Environmental Management

7.2. Supplier Programme

- 7.2.1. The Supplier shall include a logic linked project programme identifying:
- Design development time.
 - Tram survey work, if required.
 - Design approval dates. The Supplier shall allow two weeks for any
 - Authority approval.
 - LT decision hold points.
 - Critical path.
 - Time for "first in class" installation and functional testing on each fleet type.
 - Time for full fleet installation and functional testing.
 - Expected beat rate and number of days a tram will be out of service during installation.
 - Hand back arrangements.

7.3. Design and Assurance

- 7.3.1. Prior to each design, installation or commissioning stage, the Supplier shall provide

sufficient documentation for Purchaser approval in compliance with LT-IMS-ENG-107 and the attached Master Document List

- 7.3.2. All drawings and documents shall be produced in English and delivered in hard copy and electronically. Drawings shall be supplied in Bentley Micro-station and in accordance with
- Tfl CAD standard S1037
 - Collaboration/ Production Code of Practice BS1192

7.4. Design Review

- 7.4.1. The Supplier shall comply with the Purchaser's design review process and ensure that the PPOS design is reviewed with the Purchaser and any comments incorporated into submitted documents prior to final approval by the Purchaser. The Supplier shall allow two weeks for any Purchaser review.
- 7.4.2. Detailed design and assurance documentation shall be supplied in accordance with LT TAP SLI-009-134 at each stage of the PPOS project lifecycle. Design and assurance products listed in the TAP MDL are to be considered the minimum submission requirement.
- 7.4.3. Documentation shall be produced in accordance with EN 50155:2017 sections 12.1 to 12.7.
- 7.4.4. Software documentation for new designs shall be produced in accordance EN 50128:2011 or equivalent.
- 7.4.5. Tram Installation design documents shall as far as is reasonably practicable be to the same / similar format as existing manufacturer's documentation or as agreed with the tram design authority.
- 7.4.6. The Purchaser and Tram design authority will undertake a design review, the production and implementation phase will follow acceptance of the detailed design.

7.5. Design Concept

- 7.5.1. The design concept shall be supplied with the bid and shall include the following:
- a. System block diagram.
 - b. Datasheets or detailed descriptions of component parts to be used.
 - c. Dimensions, outline drawings of line replaceable units / components, mass and materials to be used.
 - d. Cable types and connectivity between PPOS system components.
 - e. Detail of proposed communications, infrastructure and OCC parts of the PPOS system.
 - f. Details of proposed tram interfaces.
 - g. Details of maintenance tools.
 - h. Design resource analysis – identifying extent of existing / modified / new designs, for hardware and software.
 - i. Designers Risk Register.
 - j. Technical Assurance Plan.
 - k. Safety Engineering and Verification Plan, including Suppliers methodology for ISA PPOS verification and validation.
 - l. Systems Integration Plan.
 - m. Supplier's methodology for PPOS SIL2 compliance.

7.6. PPOS Validation

- 7.6.1. Throughout the PPOS project lifecycle, tram and lineside infrastructure interfaces, project risks and safety risks requiring validation will be identified and

mitigated by the Supplier.

- 7.6.2. Validation procedure documents addressing each issue identified shall be produced by the Supplier in accordance with LT TAP SLI-009-134 at each stage of the PPOS project lifecycle.
- 7.6.3. Where validation tests or investigations are required on tram's or on tramway infrastructure, method statements shall be produced detailing activities, methodology, safety management and any Purchaser support resources that will be required.
- 7.6.4. Validation test reports and other documentation shall be produced at each project lifecycle stage to provide assurance that tram and lineside infrastructure interfaces, project risks and safety risks identified at concept stage have been sufficiently mitigated and are no longer a significant risk to the implementation of the detailed design.

7.7. PPOS Verification

- 7.7.1. Throughout the PPOS project lifecycle, tram and lineside infrastructure interfaces, project risks and safety risks requiring verification will be identified and mitigated by the Supplier.
- 7.7.2. Verification procedure documents addressing each issue identified shall be produced by the Supplier in accordance with LT TAP SLI-009-034 at each stage of the PPOS project lifecycle.
- 7.7.3. Tests shall be conducted as type and routine tests in accordance with EN 50155:2017 section 13, Table 12.
- 7.7.4. The Supplier shall submit test procedures for any type, routine, FAT or SAT testing to the Purchaser for approval prior to any testing or witnessing taking place.
- 7.7.5. The Purchaser, or nominated third party, shall receive 10 working days notice prior to formal tests allowing time to arrange for discretionary witnessing of some (or all) tests.
- 7.7.6. For unmodified but existing products, pre-existing type test results may be provided by the Supplier for review by the Purchaser

8. Scope

8.1. Scope of Works

- 8.1.1. The scope of works for PPOS shall be to design, assure, supply, install, integrate, commission, document and warrant the complete system as detailed within this specification. The Supplier shall be responsible for the complete scope of work identified within this specification but may wish to sub-contract parts of the scope. Suppliers that choose to sub-contract work activities shall ensure that their sub-contractors are contracted to comply with the requirements of this specification. For clarify, the scope is identified as activities in the table below but the Supplier is at liberty to organize work packages as they choose.

Work Activity No	Description	Detail
WA1	Design and supply of the PPOS technical solution and products	WA1 shall include all design, assurance, supply, installation, integration, commissioning and documentation of the technical solution and products that form the PPOS system.
WA2	Vehicle installation design	Working to interface control documents developed under WA1. A detailed installation design shall be completed and submitted for approval by the Purchaser and vehicle Design Authority.

WA3	Vehicle installation	Using documentation developed under WA1 and WA2, the Supplier shall undertake all tram installation, verification, validation and testing activities including configuration (if required) on LT trams.
WA4	Infrastructure installation design	Working to interface control documents developed under WA1. A detailed installation design shall be completed and submitted for approval by the Purchaser.
WA5	Infrastructure installation	Using documentation developed under WA1 and WA4, the Supplier will undertake all infrastructure installation, verification, validation and testing activities, including configuration (if required) on LT tramway infrastructure and highways.
WA6	Independent Safety Assessment	<p>At his own cost, the Supplier shall provide an ISA to perform independent Safety Engineering validation and verification at each stage of the PPOS project lifecycle. The Supplier shall propose the ISA for the Purchaser's approval prior to the commencement of any design activities.</p> <p>The ISA shall independently assess and report on the adequacy and Safety Engineering aspects of the PPOS system designs at each stage of the project life cycle.</p> <p>Note: Yellow Book and IEC 61508 guidance for SIL2 identifies that the ISA shall be an independent department / person but is not strictly required to be an independent organization.</p>
WA7	Project management	The Supplier shall allocate sufficient project management and supervisory resources to ensure the coordination and delivery of all work activities for the duration of the PPOS project.
WA8	Documentation	The Supplier shall ensure that all work activities are fully documented in accordance with requirements in this specification
WA9	Training	The Supplier shall provide Operational and Maintenance Manuals and training materials for all aspects of PPOS Maintenance and Operation.

WA10	Spares, Warranty and Maintenance	<p>The Supplier shall provide an additional 10% of System components as Purchaser's spares on Purchaser's acceptance of the first PPOS commissioned tram meeting its reliability requirements.</p> <p>The Supplier shall provide a 24 month warranty period for the full PPOS system from the date of the final PPOS commissioned tram meeting its reliability requirements.</p> <p>The Supplier shall provide PPOS 2nd line maintenance, including fault diagnostics and component repair, for a 24 month period.</p>
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8.1.2. Designated high risk areas where PPOS is to be applied will be defined by LT following conclusion of risk analysis studies in conjunction with TOL. These will be available prior to entering in to contract; an example 'high risk' area is the Sandilands junction and approaches.
London Trams have identified 22 high risk locations where the speed prevention system is required. The system is required to be installed at these 22 locations only. The high risk locations are defined in the document provided titled 'PPOS High Risk Locations 3.0'. The 21 locations are highlighted in yellow and have a total score of 7 or more.

8.1.3. Conditional speed protection is not required for initial deployment of PPOS but the capability should be available if required in the future.

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9. General Requirements

The following general requirements apply to the complete PPOS system:

9.1. Functional Safety

- 9.1.1. The PPOS over speed protection function shall be provided with safety integrity to SIL 2, including for communications between tram and lineside system components.
- 9.1.2. Other functionality (such as tram to OCC communications and event logging) may not be required to satisfy safety integrity SIL2 if suitably de-coupled from the PPOS over speed protection function. The Supplier shall provide justification for any functionality of PPOS not meeting SIL2.
- 9.1.3. The Supplier shall employ design, manufacture and maintenance processes compatible with SIL 2 practice.
- 9.1.4. Suppliers shall use IEC61508, EN50128 or equivalent standards for management of safety. The standards to be used to shall be identified.

The Employer has determined that SIL 2 is the appropriate safety integrity for PPOS based on the following background and assumptions:

- Determined by Independent Safety Assessment Report (ARC-504-007-R011 Issue 3);
- PPOS will interface to the existing 'safety circuit' and the existing function/safety integrity of this safety 'safety circuit' will not to be compromised by PPOS modification;
- PPOS will bring the tram to a standstill and impose a time penalty. PPOS must not provide a 'cruise control' speed limit function;
- PPOS will apply full service brake but not the hazard (track) brake; PPOS will not provide driving guidance;
- PPOS is the over speed protection 'of last resort'. Speeding and driver behaviors will be monitored by other systems such as vigilance, iTram and OTDR.

- 9.1.5. Evidence of appropriate experience and audit to a suitable standard for functional safety shall be provided.

EN 50126 should be considered for Reliability, Availability Maintenance and Safety (RAMS). EN 50128 or IEC 61508-3 are concerned with the lifecycle model for software development.

- 9.1.6. The scope of RAMS and ISA assessment shall cover the complete PPOS system, including its on-tram and infrastructure elements. The impact of PPOS human interfaces in the tram cab and OCC shall be considered and minimised.
- 9.1.7. The Supplier's safety analysis shall consider case examples based upon the high risk locations determined by the Purchaser.
- 9.1.8. The Supplier's scope shall include WA6 (ISA) that shall consider all aspects (WA1 to WA9) over the PPOS's lifecycle.
- 9.1.9. The Supplier shall produce a FMEA to understand failure modes that could cause the PPOS to erroneously prevent tram movement under all possible operating conditions.

9.2. Electronic Equipment Standard

- 9.2.1. PPOS system assemblies to be installed on tram shall conform to the current standard for rolling stock EN 50155:2017.
- 9.2.2. Any equipment installed underframe or on rooftop shall take full account of the more extreme environmental conditions in such locations.
- 9.2.3. The choice and design of rooftop antennas shall take into account risks arising from OLE, including de-wirement risk.

9.3. Reliability and Service Delay

- 9.3.1. The 'useful life' of PPOS, as defined by EN 50155:2017, shall be >25 years.
- 9.3.2. The on-tram PPOS components supporting functional safety shall be designed to achieve reliability of > 100K hours MTBF per tram throughout the useful life.
- 9.3.3. The on-tram PPOS components supporting communications and event logging shall be designed to achieve reliability of > 50K hours MTBF per tram, throughout the useful life.
- 9.3.4. The lineside PPOS components supporting functional safety shall be designed to achieve reliability of > 100K hours MTBF throughout their useful life.
- 9.3.5. The mean time to repair and verify (MTTR) for the on-tram PPOS system shall be no more than 1 hour for one person.
- 9.3.6. The mean time to repair and verify (MTTR) for the lineside PPOS system shall be no more than 1 hour for one person.
- 9.3.7. Across the entire fleets, no more than 5 standstill events per annum shall be caused by erroneous over speed intervention.
- 9.3.8. Availability of onboard PPOS shall be verified when a cab is made active and by use of PPOS test locations, for example on the depot exit road.
- 9.3.9. Authorised isolation (disabling) due to PPOS system failures should not be required more than 5 times per annum across the entire fleets.
- 9.3.10. The on-tram PPOS shall provide a method of verifying and reporting availability of components installed within the infrastructure.
- 9.3.11. Suppliers shall identify in their proposals any maintenance or overhaul requirements necessary over useful the life to maintain reliability and availability requirements as set out in the clauses above.

9.4. Environment

- 9.4.1. Environmental conditions applicable to tram on-board equipment are defined in EN50125-1. Temperature classification T1 shall be used.
- 9.4.2. Environmental conditions applicable to equipment within the infrastructure are defined in EN 50125-3. Temperature classification T1 shall be used.
- 9.4.3. The influence of environmental conditions on tram to infrastructure communication (air-gap) shall be fully considered and verified by type tests.
- 9.4.4. Use of components on track sleepers or on a highway shall consider the influence of flooding, snow, and ice to an extent where tram service would normally continue. Environmental factors may influence selection of the radio frequency spectrum to be used.
- 9.4.5. Components installed at ground or sleeper level shall be ingress protected to a minimum IP67.

9.5. Electromagnetic compatibility

- 9.5.1. EN 50121-3-2 (current version) shall apply.
- 9.5.2. The Supplier shall provide an EMC test report and certificate of conformity for both the on-tram PPOS system and its trackside components.
- 9.5.3. EMC type tests of the on-tram PPOS system shall be conducted using harnesses of the same design that will be installed on the trams.
- 9.5.4. The CR4000 tram's were built in 1998 and therefore (in the absence of contrary information) the Supplier should assume that over voltage, surge and transients on the electrical supply and supply related interfaces are at the worst case extremes of EN 50155:1996 and EN 50121-3-2.
- 9.5.5. The Supplier's EMC design and test plans shall fully consider the co-existence between existing tramway systems and PPOS, and if necessary utilise spectrum and power levels that minimise any risk of incompatibility between tram, infrastructure and PPOS.

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PPOS could use several different radio frequencies for communication and positioning. The tramway already uses radio frequencies for communication between tram and infrastructure supporting voice communications, vehicle location and control etc. The supplier should consider co-existence and compatibility.

9.6. Fire Protection

- 9.6.1. Equipment and cables used for the on tram PPOS shall conform to EN 45545 fire performance standards.
- 9.6.2. The Supplier shall submit certificates of conformity and test certificates for materials to be used in the tram installation.
- 9.6.3. The Supplier shall submit a material inventory (type and mass) for equipment together with datasheets for any material that isn't protected in a suitably sealed non-flammable enclosure.

9.7. Structural Integrity

- 9.7.1. The Supplier shall undertake design reviews and calculations and submit a report to demonstrate structural integrity of PPOS equipment as installed on trams.

9.8. Security

- 9.8.1. PPOS shall be secure from any unauthorised tampering, for example unauthorised removal of power or the unauthorised removal or erasure of event memory.
- 9.8.2. PPOS shall be implemented in accordance with cyber security best practice.

On the tram it should not be possible to disable PPOS by an MCB accessible to the driver. Event storage memory should be securely contained within a locked enclosure. Information downloaded and stored centrally should be secure. Within the infrastructure, consider the security and validity of data, for example if re-programmable RFID is used. Cyber security best practice guidelines are available from NIST and NCSC.

- 9.8.3. Track based PPOS components should take account of and be protected against the following threats as a minimum:
 - On track machines, including tampers, rail grinding, ballast brushing and OHLE access equipment.
 - Theft, i.e. consider that new components in railway infrastructure may be stolen in the belief they contain valuable metals.
 - Vandalism.
 - Highway based PPOS components shall be protected against:
 - Highway maintenance, e.g. road roller, snow plough etc.

9.9. Tram Gauge and Clearance

- 9.9.1. The Supplier shall ensure that the existing ground clearance of the tram is maintained.
- 9.9.2. The Supplier shall ensure that the existing track envelope is maintained.
- 9.9.3. The Supplier shall take full account of displacement from track centre line if underframe readers are mounted away from bogie pivot point and shall declare any limitations relating to placement of track components on or near track curves.
- 9.9.4. The Supplier shall ensure that roof top antenna(s) are within dynamic gauge clearance.

9.10. Service and Maintainability

- 9.10.1. PPOS components (line replaceable items) shall be designed as interchangeable with plug / socket connections.

9.10.2. Plug and socket connections shall be latching, polarised and suitable for the intended environment.

9.10.3. Configuration of line replaceable items should not be required, with the exception of the track component which may be configured with specific location based data.

10. Functional Requirements

10.1.1. The PPOS shall protect against over speed and shall be available upon approaching any section of tramway track (location) designated as high risk.

10.1.2. 'High risk' locations will be determined by the Purchaser during the detailed design phase, post contract.

10.1.3. Quantities and types of 'high risk' location are stated in 8.1.2.

10.1.4. 'High risk' locations will be categorised by the Purchaser as 'fixed' or 'conditional'.

The Purchaser has not currently identified any high risk locations that would encounter conditional over speed limit. However, the PPOS design should have the capability to add conditional high risk locations in the future.

10.1.5. The PPOS function shall be disabled, or revert to a configurable default maximum over speed value upon exit from the defined 'high risk' location.

10.1.6. It shall be possible to cascade 'high risk' locations to provide incremental reductions to the over speed value, i.e. the tram may be operating over track where maximum line speed is allowed, then enter a location where the over speed protection is 60km/h, after a short distance the over speed protection may then be 30km/h and after clearing the 'high risk' location, maximum line speed may be permitted.

10.1.7. The detection of high risk locations, the over speed limit and direction of travel shall be capable of operating anywhere on the tram network, including within tunnels and at depots etc.

10.1.8. PPOS shall include a function to validate the plausibility of the determined speed.

Speed may be determined from existing on-tram odometer(s) used for WSP and speedometer functions. However, PPOS should include a method of validating speed indicated by the existing system, e.g. time to pass over fixed components within track infrastructure, or GNSS with low dilution of (speed) precision (DOP).

10.1.9. PPOS shall include human interfaces for the driver, comprising an indicator (on the cab desk) and an isolation switch.

10.1.10. The PPOS cab desk indicator shall identify the following events:

- a. Success or failure of PPOS self test when a cab is made active
- b. Failure of PPOS identified during service operation
- c. Activation of PPOS over speed protection
- d. An activated PPOS following standstill and timeout, until reset.

10.1.11. Use of colour aspect or cadence of the indicator to identify the event may be used so long as there is no conflict or distraction. Human factors shall be evaluated and any impact minimised.

10.1.12. The PPOS in cab isolation switch shall have the following functional characteristics:

- a. Provide clear irreversible indication of operation, i.e. a seal or glass rod to be broken,
- b. Disable PPOS from opening the 'safety circuit' and activating full service brake.

10.1.13. At power up and cab activation, PPOS shall undertake a self test and identify health / fault condition to an event log. The tram driver will receive simple indications as

detailed in 10.1.10 and 7.1.19.

- 10.1.14. PPOS functions shall be available within 30s of a driving cab being made active.
- 10.1.15. To allow drivers to power off the tram for a short periods of time in order to leave the tram e.g. to hand swing points, PPOS shall remain available for these durations and shall not require reboot when tram power is reapplied.
- 10.1.16. PPOS shall recognise extended periods of tram power off, e.g. tram stabled in depot overnight, and should load shed appropriately.
- 10.1.17. If PPOS has determined that speed of the tram exceeds the current over speed limit for the location, then it shall trigger the following events:
- Operation of full service brake, bringing the tram to a standstill (through breaking the 'safety circuit')
 - Operation of the cab desk PPOS indicator (reference 10.1.10 c)
 - Communicating an alert to the OCC
 - Maintaining the tram at standstill for a time period, allowing time for the OCC to respond to the event (time to be agreed during detailed design).
- 10.1.18. Following PPOS activation, determination of standstill condition, expiry of the standstill timer and reset PPOS shall function as follows:
- PPOS shall re-close the 'safety circuit'.
 - The PPOS cab desk indicator shall change state to condition 10.1.10 d. This condition shall be retained until PPOS is reset.
 - PPOS shall communicate to the OCC any tram movement (speed >10km/h), following expiry of the standstill timer.
- 10.1.19. The method for 'reset' of PPOS shall be determined during the detailed design stage, with the following options to be considered:
- Automatic reset upon expiry of the standstill timer, or;
 - After expiry of the standstill timer and then cab shutdown followed by making the cab active again, or;
 - Until intervention by an authorised person, i.e. requiring a key, code or device before reset is achieved.
- 10.1.20. PPOS shall verify the determined location and direction; any anomaly shall be recorded by the event logger.
- 10.1.21. If the direction cannot be determined then PPOS shall fail-safe to provide over speed protection at the lower over speed value of each direction.

Failure to read an individual on track component may lead to unknown or unreliable understanding of direction. With differing over speed depending on direction, the lower over speed limit should be applied as a failsafe

- 10.1.22. The on-tram PPOS shall log the following events with Tram ID, date/time, speed, location, and direction shall report the events to the OCC as soon as they are detected.

For example, if location is to be identified by an on track component such as RFID, then a sequential group (duplicate or triplicate) components could be used to verify location, identify direction and support speed plausibility checks. Failure to read an individual on track component can be alerted with some degree of functionality maintained.

- a. Cab made active and outcome of self test
- b. Location determination anomaly
- c. Speed plausibility anomaly
- d. PPOS over speed brake intervention
- e. Movement >10km/h following automatic 'reset' (Note: If 'reset' option 10.1.18 a is used, the OCC can be notified if the driver operates the tram following automatic reset)
- f. 90% of over speed event within the high risk area, i.e. beyond the location where the over speed limit applies and until exit at the location where the over speed limit is removed or changed to another value.
- g. PPOS reset
- h. PPOS isolation

10.1.23. The on-tram PPOS shall download its event log to a ground or cloud-based PPOS maintenance server within 48 hours and collaborate with the server to provide a complete record.

10.1.24. The Supplier shall propose the detailed functionality of PPOS alerts in the OCC, with reference to requirements in section 12.1.

11. System Requirements

11.1. PPOS On-board System Architecture Concept

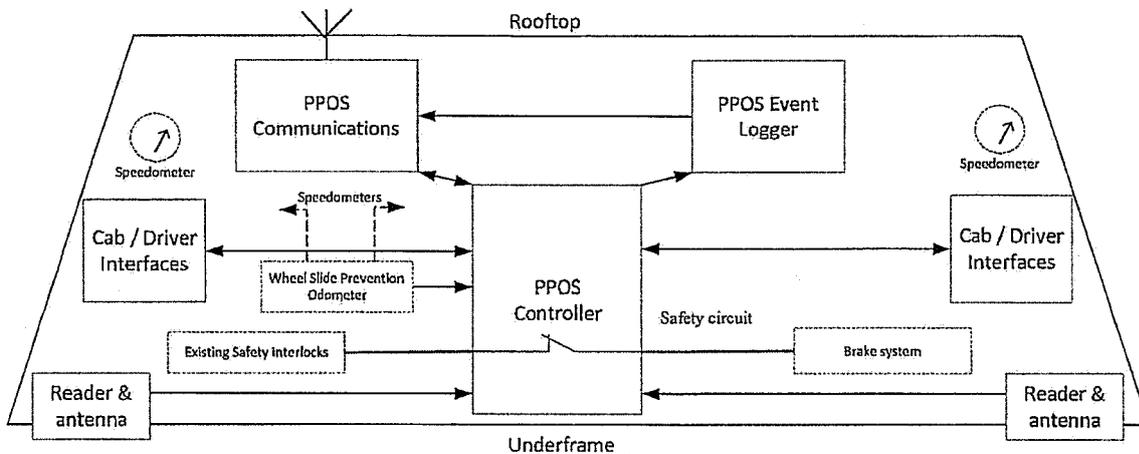


Figure 1 - PPOS Conceptual Architecture for tram

11.1.1. Figure 1 is conceptual intended for the purpose of supporting system requirement clauses and descriptions within this specification. Supplier proposals shall include a similar diagram depicting their proposed PPOS architecture to support their own description of the proposed solution.

A single controller is shown in example Figure 1. Alternatively, a PPOS controller could be allocated to each cab end. Figure 1 also shows readers (to collect data from a track based component) under each cab, but alternative arrangements to determine location may be offered.

11.1.2. The diagram identifies the PPOS Controller with integral relay contact that will break the 'safety circuit'. The PPOS isolation arrangement may be in parallel with this contact but is not shown for clarity.

11.1.3. The Supplier shall engage with the tram design authorities to obtain authority and/or 'statement of no objection' to all the proposed tram interfaces.

11.2. Safety Circuit Interface

11.2.1. Existing tram design principles of segregation and identification (cable colour and markers) for the safety circuit shall be followed where possible.

11.2.2. The PPOS relay in series with the safety circuit may be integral or external to the PPOS controller. If an external relay is used, then the circuit powering the relay coil shall also be installed as a safety circuit.

11.2.3. The PPOS relay contact shall be suitably rated to switch the safety circuit load. The supplier shall provide documented evidence of suitable rating.

'Suitably rated' is qualified as follows:

- Relay contact rated for $1.4 \times U_n$ and the surge / transients identified in 10.2.6 of EN 50155:1996. The contact shall not require surge / transient protection by an additional component as failure modes of suppression devices may be unpredictable.
- The contact shall be rated to the current / time characteristic of the MCB protecting the safety circuit.

11.2.4. The PPOS relay should be tested by the PPOS self test regime, as a minimum each time the tram is powered.

A force guided safety relay conforming to EN 50205 would provide feedback that the relay achieved both open and closed operating states. Alternative arrangements to confirm viability of PPOS interception on a regular basis may be proposed.

11.2.5. The Supplier shall validate existing tram safety circuit function to confirm that when safety circuit continuity is momentarily opened, the existing tram brake system design ensures that standstill is achieved before normal traction can be re-engaged.

11.2.6. The PPOS design shall maintain interruption of safety circuit until standstill is determined from the PPOS speed input and the standstill timer has expired.

11.2.7. Where PPOS is activated at test locations, the standstill time period should default to zero, i.e. at defined test locations the tram driver may be allowed to proceed as soon as standstill has been achieved, without applying the additional time delay after standstill.

11.2.8. PPOS shall open the safety circuit within 50ms of a tram exceeding the over speed limit.

If a sequence of several track based components are required to identify location, direction and over speed; then a decision to intervene may not be made until passing over the last in sequence. At 70km/h maximum speed, after passing the last component in sequence, the distance travelled before safety circuit is broken would be 1.1m.

11.3. PPOS Isolation

11.3.1. A PPOS isolation switch shall be installed in each tram cab, the arrangement shall be consistent with the design of other safety system isolation arrangements for that particular tram, i.e. use the same switch type and same method of identifying when a safety system has been isolated. The PPOS isolation arrangement shall allow normal traction and braking to be restored, regardless of PPOS failure mode.

Typically, the isolation will add a shunt bypass relay or switch contact across the open PPOS relay contact such that isolation is effective should the PPOS controller encounter any PPOS failure mode including disconnection of the PPOS controller.

11.3.2. Operation of the PPOS isolation switch shall be recorded by PPOS, and shall also be reported by PPOS to the OCC as an event.

11.4. Speed and Distance Determination

11.4.1. PPOS should identify speed and distance by interfacing with an existing system on the tram.

11.4.2. The Supplier shall investigate interfaces from vehicle schematics and by technical analysis of each tram type with validation tests to confirm suitability of the interface.

Typically, the WSP system will use several wheel probes to determine wheel rotation and thus identify when wheel side occurs. Using the wheel rotation input and adjustment to compensate for wheel diameter (following wear), a speed is determined by the WSP which normally then provides a signal that operates the speedometer display for the tram driver.

11.4.3. The method of interface to obtain the speed shall have no impact on function and integrity of existing tram systems.

The interface should provide galvanic isolation and not significantly load the existing signal source.

11.4.4. The Supplier shall undertake an FMEA and reliability study on this interface to demonstrate that the risk of influencing other systems is exceptionally low e.g. the speedometer value as presented to driver.

11.5. PPOS Location, Direction and Over Speed Limit

11.5.1. It shall be possible to apply temporary changes in PPOS over speed limits, and to implement PPOS in additional 'high risk' locations.

A track based component (RFID/ balise) could provide an opportunity for temporary components to be deployed at the same time as temporary speed signs are installed trackside.

11.5.2. The method of identifying PPOS location / positioning shall also support determination of tram travel direction.

Some tracks are bi-directional and bi-directional working may be necessary. Direction could be determined from a GNSS heading (when moving) or passage over a balise group or sequence of RFID components

11.5.3. Any track based component should communicate the over speed limit for each direction of travel.

11.5.4. Any track based component should uniquely identify each track component and sequence order of components at that location.

11.5.5. Any track based component should include a parameter to identify distance to start and end of the high risk area for a given direction.

11.5.6. Any track based components should identify the unique characteristic of a location.

Some locations may be allocated for PPOS test purposes, for example on a depot exit road a PPOS test may be activated and the function may differ from normal over speed intervention. It may be useful to identify whether the location has fixed or conditional data. It may also be useful to reserve codes for future applications of PPOS, or to identify a specific tramway infrastructure.

- 11.5.7. Communication from any track based component to the tram should include a cyclic redundancy check, error correction, or repeated transmission to support reliable and error free communication of the data payload.
- 11.5.8. Any track based components shall be passive, not requiring batteries.
- 11.5.9. Any track based component shall be designed without the need for overhaul during their useful life.
- 11.5.10. Where a track based component is required to provide alternative data depending on condition (e.g. depending on aspect of a stop signal), an isolated electrical interface shall be provided.
- 11.5.11. Where GNSS is used, at least two satellite constellations shall be utilised concurrently, e.g. GPS and Galileo, or GPS and GLONASS.
- 11.5.12. Where GNSS is used, the Supplier shall evaluate vulnerabilities and mitigate any identified risks, e.g. L1 band jamming.

11.6. Driver / Cab Interfaces

- 11.6.1. The Supplier shall identify any other input signals necessary for PPOS operation.
- 11.6.2. PPOS may require an interface from existing tram control signals to identify when a cab has been made active. Input interfaces shall be protected against surge and transients in compliance with EN50121- 3-2 and EN 50155:1996.
- 11.6.3. All output signals shall be protected against surge and transients in compliance with EN50121-3-2 and EN 50155:1996.
- 11.6.4. The requirements for the in cab PPOS isolation switch are provided in section 11.3.
- 11.6.5. The PPOS indicators and Isolation switch shall be indelibly labelled in accordance with existing practice for each particular tram design.

11.7. Event Logger

- 11.7.1. The PPOS event logging function may be processed within an independent processing sub- system thereby eliminating influence on safety integrity.
- 11.7.2. The event logging function shall include a source of time / date with resolution of 0.1s increments.
- 11.7.3. Time accuracy shall not deviate from actual time by more than +/- 1sec.

Time synchronisation could be limited by availability of tram communication allowing for use of NTP to be used as a correction for a crystal controlled real time clock.

- 11.7.4. Time and date shall be available whenever power is applied to the tram and PPOS system, on the assumption that tram battery isolation is no longer than 48h.
- 11.7.5. PPOS shall not use battery/storage technology having less than the system's useful life.
- 11.7.6. PPOS event logger storage capacity shall be sufficient for 28 days storage of events identified in clause 10.1.22.
- 11.7.7. The storage media shall be secure from theft or tampering, and should be of a commonly available type suitable for the tram environment.
- 11.7.8. The storage media should be protected against impact and fire.

This is basic protection, i.e. SD or Flashcard within an enclosure. The requirement does not extend to survivability as expressed in EN 62625-1.

- 11.7.9. The storage media should be removable from PPOS equipment installed in the tram.

11.8. PPOS Communications

- 11.8.1. PPOS shall support automatic daily wireless downloading of the event log within the

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confines of the depot.

- 11.8.2. Events identified in 10.1.21 shall be downloaded wirelessly in 'near real time'.
- 11.8.3. Near real time in this context should be taken to mean in less than 10s average but no more than 20s.
- 11.8.4. Near real time event communication shall be supported from any location on the Croydon light rail network (the tramway).
- 11.8.5. The protocol for near real time event reports shall include acknowledgment by the recipient and the tram communication system shall make re-transmission attempts if an acknowledgement isn't received within an acceptable time period. The PPOS Supplier should investigate opportunities for using or sharing existing communication facilities between tram and ground systems.
- 11.8.6. In the absence of available alternatives, PPOS shall be equipped with a dedicated communication capability.
- 11.8.7. Where a dedicated communication sub-system is to be supplied, due consideration shall be given to lowest possible life cycle cost (CAPEX and OPEX).

For coverage over the entire Croydon tramway, roaming onto several mobile networks operators (MNO) may be required.

Event recorder download may be supported by Wi-Fi download with a 'hot spot' located at a pinch point where the tram will dwell for an adequate time. The Supplier should investigate whether Wi-Fi access point(s) already exist at depot and feasibility of sharing for event logger downloads.

- 11.8.8. Where public mobile networks are to be used, the Supplier shall undertake a survey throughout the tramway to determine network coverage offered by each MNO.
- 11.8.9. The communication capability may use different communication medium for 'real time' transmission and larger data transfer from the event logger. Large file transfer having less time critical requirements.
- 11.8.10. The Supplier shall include all necessary equipment and installation for interfacing to existing communications, or for an independent communications solution.

11.9. System Software Requirements

- 11.9.1. The following requirements shall apply only if electronics have internal microprocessors which require software to function.
- 11.9.2. The Supplier shall ensure that the System will automatically 'Boot Up' and be functional within 30 seconds of power being applied.
- 11.9.3. To allow drivers to power off the tram for a short periods of time in order to leave the tram e.g. to hand swing points, PPOS shall remain available for these durations and should not require reboot when tram power is reapplied.
- 11.9.4. The System shall be capable of automatically recovering from internal software faults.
- 11.9.5. The System shall be capable of automatically recovering in the event of a power loss.
- 11.9.6. The Supplier shall ensure that any maintenance, diagnostic and health monitoring software or features are accessible using a standard web browser such as Windows™ Internet Explorer 10™ or later.
- 11.9.7. The Supplier shall ensure that any communication connection to the System for maintenance, diagnostic and health monitoring purposes does not require proprietary interfaces.

12. Supporting Tools and Systems

12.1. OCC Alert

12.1.1. OCC staff shall be alerted to PPOS events received in 'near real time'. Delivery of OCC alerts should be reliable with acknowledgement of valid receipt returned to the originator.

Alerts received at the OCC shall comprise the following:

- a. A distinctive but brief alert or announcement at a level configurable up to 85dB(A) average at control room operator seated positions.
- b. A visual indication alerting that a PPOS event has activated. This visual indication may be via coloured indicators within the OCC or a graphical display
- c. An over speed PPOS intervention alert shall be audibly and visually distinct and with higher priority than other PPOS alerts for technical failures.

12.1.2. The OCC should have the capability to suppress recurrent alerts of restricted type for a period of time, for example for 24h.

Failure or loss of a RFID component should create a 'location determination anomaly'. Every tram passing that location should generate this same event but the OCC should not be troubled by repeated alerts. Likewise, speed plausibility failure may be repetitive from a particular tram. Over speed intervention is unlikely to be repetitive and should this be the case the offending tram would be taken out of service or the PPOS on that particular tram would have a temporary isolation applied.

12.1.3. The Supplier shall propose a method for routine testing of the OCC alert system.

12.1.4. All historical alerts and data generated by PPOS shall be accessible for a minimum of 12 months after generation.

12.2. Event Download Analysis

12.2.1. The Supplier shall provide a software tool to automatically analyse the event logs downloaded from the tram fleet.

12.2.2. The tool should be developed and documented in a manner that will allow the Purchaser to modify or extend analytics in the future.

12.2.3. A method shall be available of interrogating the PPOS stored data to review all event reports and their details, in particular relating to a tram that has triggered over speed protection.

12.2.4. The analytical tool shall allow the following to be identified as a minimum over day, week, month and annual periods:

- a. Cabs/trams where there are self test failures
- b. Locations where there are anomalies
- c. Trams with speed plausibility issues
- d. High risk location speed entry average and maximum values
- e. Average and maximum speed attained within a high risk over speed zone
- f. PPOS intervention events and reset times.

12.2.5. The software tool shall provide export in Microsoft Excel format.

12.3. Track Component Configuration

A track component to support determination of location and direction of travel is typically either a balise or RFID tag that will normally be tele-powered, i.e. passive component with no battery that would limit useful life.

- 12.3.1. It is anticipated that the track component will be securely sealed within the highway or upon a track sleeper and should be programmable in-situ.
- 12.3.2. It may become necessary to change an over speed limit at a high risk location in the future and therefore re-programming capability shall be available to the Purchaser.
- 12.3.3. The track components should be secure to the extent that re-programming is protected by a cryptographic key and data content is validated post programming.
- 12.3.4. A quantity of two handheld programming tools and associated reader/writer heads with connecting leads shall be supplied.
- 12.3.5. The Supplier shall identify a SIL2 process for management and validation of track component programming utilising feedback from on-tram event logs to confirm the correct sequence, location and data content of track components.

12.4. *Tram Maintenance Tool*

- 12.4.1. The Supplier shall provide tools necessary for the maintenance of the on-tram parts of PPOS. This tool(s) should include the following as a minimum:
 - a. Test and analysis of speed input
 - b. Test and analysis of track component reader output
 - c. Interrogation of PPOS processing systems, including 'reset' function.
 - d. Testing of communications function including ability to analyse communication capability throughout the tramway.
- 12.4.2. Factory Acceptance Tests (FAT) shall be conducted on a PPOS system integrated with simulators that substitute for existing tram interfaces.

The odometer simulator should have the capability to generate acceleration, deceleration and changing line speeds typical of the speed profiles throughout the Croydon tramway.

- 12.4.3. The Supplier shall maintain an operational FAT test rig for the duration of verification tests until the end of the warranty period to be available for verification of any subsequent modifications or upgrades.
- 12.4.4. First Article Inspection (FAI) will be conducted prior to first batch equipment deliveries for installation and may be undertaken immediately before commencing FAT.
- 12.4.5. The FAT test shall demonstrate the functionality of the entire PPOS software and hardware including parts that are within infrastructure, OCC and back office.
- 12.4.6. Upon satisfactory completion of FAT, and acceptance of Engineering Change for single tram testing, the System Acceptance Test (SAT) stage may commence.
- 12.4.7. A preliminary SAT shall be conducted with PPOS installed on a single tram of each type (CR4000 and Stadler).
- 12.4.8. The purpose of the preliminary SAT is to verify tram installation design and function / parametric performance, i.e. FAT will be simulating

some interfaces whereas SAT will use the on-tram system interfaces.

Preliminary SAT should begin with static tests but may include movement of tram within depot or other means to simulate speed / movement.

- 12.4.9. Upon satisfactory completion of preliminary SAT, and approval by the Purchaser, full SAT testing may commence.
- 12.4.10. Full SAT testing will verify the design of both the on tram PPOS and the lineside infrastructure components, i.e. a full system test.
- 12.4.11. Full SAT may require configured over speed values at higher risk locations to be set lower and out of hours testing one tram equipped with PPOS. Operation of over speed protection shall be demonstrated and proven to be reliable but under safe operating conditions.
- 12.4.12. Upon satisfactory completion full SAT and demonstration of reliability and availability, full fleet fitment shall be undertaken.
- 12.4.13. A production test and certificate (certificate of conformity) shall be provided for each tram c o m m i s s i o e d with a fully functional PPOS.
- 12.4.14. The warranty period shall commence upon counter signature of the production test certificate by the Purchaser (or the Purchasers representative) for the last tram to enter service with a c o m m i s s i o n e d fully functional PPOS.
- 12.4.15. The 'go live' phase shall be deemed to commence when at least two tram's of each class type have countersigned production test certificates and the Purchaser has accepted the infrastructure, OCC facilities and maintenance tools.

12.5. Maintenance, Operation and Overhaul Documentation

- 12.5.1. The Supplier shall produce the following documents for the OCC, lineside and on tram elements of the PPOS system:
 - a. Operator instructions (prepare text for inclusion in existing driver manuals).
 - b. Fault finding guide (with flowchart).
 - c. Routine maintenance test procedure.
 - d. Commissioning and test procedure (following replacement of equipment).
 - e. Overhaul procedure (if overhaul is required).
 - f. Configuration procedure (for track infrastructure components).
 - g. Operating procedures for supporting tools.
 - h. IT configuration and fault finding for communications and support tools.
 - i. Return to Supplier requirements, e.g. packaging requirements, return address etc.
 - j. Obsolescence plan.

13. Materials

- 13.1.1. The Supplier shall be responsible for the purchase and delivery to site of all specified materials as required by the design.

14. Where possible the Supplier shall provide the material to site in kits. Deliveries to site will match the fitment plan to prevent stockpiling of material. Training

- 14.1.1. The Supplier shall prepare training documentation for the following:

- a. Updates to tram drivers, driver management and OCC operators standard operating procedures.
- b. Updates to tram Maintainer's standard operating procedures.
- c. Updates to lineside Maintainer's standard operating procedures.
- d. Process and procedure training of tram drivers, driver management and OCC operators.
- e. Process and procedure training of tram Maintainers.
- f. Process and procedure training of lineside infrastructure Maintainers.
- g. Process and procedure training of OCC Maintainers,
- h. IT Support.

14.1.2. The Supplier shall 'train the trainer' in respect of tram driver operations

14.1.3. The Supplier shall provide 'on the job' training and 'assessment of competency' in respect of 'safety related' configuration of the on-track component.

14.1.4. The Supplier shall provide a minimum of 3 separate train the trainer events for the OCC, Infrastructure and Fleet maintenance team.

14.1.5. Training will be carried out at the Therapia Lane Depot in East Croydon.

15. Warranty

15.1.1. PPOS system components shall be supplied with 24 month warranty effective from the date the last system component is accepted by the Purchaser into service.

15.1.2. The Supplier shall provide on-site resources for 5 days following the PPOS system 'go live' phase to assist with any maintenance, configuration, training or reliability issues that may arise.

15.1.3. Should any endemic failures or significant non-compliance with requirements in section 6.1 arise during the warranty period then the warranty period for all PPOS scope shall be extended until such time as the problem is remedied by repair or design change

15.1.4. The Supplier shall provide 10% of System components to the Purchaser as spares.

15.1.5. The Supplier shall include an option to provide a sufficient number of spares based on the expected MTBF to last the remaining life of the trams within the scope of supply.

16. Licencing

16.1.1. The Supplier shall provide the Purchaser with any and all licensing rights required to operate the PPOS system in perpetuity.

17. General Constraints

17.1.1. Access to site – The Contractor would need to give 3-5 working days' notice for site access.

17.1.2. Start of tram service is 04:15 at Therapia Lane Depot; last tram to return to Depot from service 00:45. On Sundays 1st Tram out is 06:00 instead of 04:15.

17.1.3. London Trams Engineering hours are dictated by out of service hours.

- 17.1.4. A standard office hours (09:00-17:00hrs) and 5 day working week will apply for all London Trams staff during this commission.
- 17.1.5. Interruption to operational service should not be affected by the works being carried out. It is important that this is factored into the assumed Programme. Limited access will not be accepted as failure to meet programme.
- 17.1.6. Design issues may affect programme. Consideration must be given to the design element when considering how the alternative power source will be implemented and interfaced with other power sources.
- 17.1.7. London Trams would require 4 weeks notice of any design meetings to be carried out at the Suppliers offices in Derby.
- 17.1.8. London Trams will use best Endeavours to minimise design review time, However Contractors should make an appropriate allowance to account for occasions were multiple design review iterations are required.

18. Things Provided by the Purchaser

- 18.1.1. License to gain access to London Trams Therapia Lane depot, trams and infrastructure to perform PPOS delivery related activities.
- 18.1.2. Storage of reasonable Supplier's tools and equipment at Therapia lane depot.
- 18.1.3. Available tram and lineside infrastructure design and configuration information
- 18.1.4. Therapia Lane depot welfare facilities and site induction training will be made available without charge to the Supplier.
- 18.1.5. Access to London Trams staff. This will be available on request within 3-5 working days.
- 18.1.6. Desk space for 2 people at the London Trams Depot at Therapia Lane.
- 18.1.7. Welfare facilities at Tralink House will be provided. This includes access to water, toilets and breakout areas.
- 18.1.8. London Trams will allow the Supplier to dispose of any small wastes such as packaging and tram materials. Any hazardous products will need to be disposed of by the Supplier.
- 18.1.9. Drawings will be provided, when available, in Micro-Station Format.
- 18.1.10. London Trams will secure drivers approval. This will be achieved through at least 3 workshops.
- 18.1.11. London Trams will provide technical staff to answer queries during the installation on trams.
- 18.1.12. London Trams will provide drivers and service paths in support of the testing and commissioning.
- 18.1.13. London Trams will make one vehicle available at a time on consecutive mid-week days for installation and that these will be provided in a random manner (either a Bombardier or Stadler vehicle each day) as per LT operational availability.
- 18.1.14. Isolation of the OLE will be facilitated and managed by London Trams.
- 18.1.15. All work within the depot to be performed at height is expected to require an isolation of the OLE which we assume will be facilitated and managed by London Trams.

SECTION 3

SCHEDULE 3

Technical Assurance Plan

Introduction

- 1.1.1. Following overturning of Tram 2551 in November 2016 with catastrophic consequences, RAIB have recommended that UK Tram operators should research ways of initiating appropriate automatic responses to tram over speeding events. If reasonably practicable such devices should be introduced onto UK tramways.
- 1.1.2. Recommendation 3 from RAIB in their report on the Sandilands incident (Report 18/2017: Overturning of a tram at Sandilands junction, Croydon) states that:
- 1.1.3. "The intent of this recommendation is to prevent serious accidents due to excessive speed at higher risk locations on tramways. These locations are likely to include all locations where a substantial speed reduction is required for trams approaching at relatively high speed. Implementation of this recommendation may be assisted by work in this area already underway by Croydon tramway organisations"
- 1.1.4. LT have taken the decision to both investigate and implement such a solution, and have designated the delivery as the Physical prevention of Over Speed (PPOS) project.
- 1.1.5. The PPOS project shall deliver a system capable of vehicle speed monitoring and automatic brake application at defined high risk points on the network, thereby significantly reducing the likelihood and frequency of trams over speeding in defined high risk areas. The system will both locally record and report key events to the Operational Control Centre (OCC).
- 1.1.6. An independent Safety Risk Analysis commissioned by LT has determined that due to its safety critical nature, PPOS shall be provided with a Safety Integrity Level (SIL) rating of SIL 2.

2. Purpose

- 2.1.1. This document is the Technical Assurance Plan (TAP) for the London Trams (LT) Physical Prevention of Over Speed (PPOS) Project.
- 2.1.2. This TAP describes the technical assurance activities to be undertaken by the PPOS Supplier, and the minimum evidence to be produced in support of this asset change.
- 2.1.3. This TAP outlines key Supplier assurance activities and planned targets for passing project lifecycle Assurance Gates. Supplier compliance with the TAP shall provide confidence that the introduction of PPOS is, as far as is reasonably practicable, underpinned by sufficient technical assurance to support continued safe and reliable operation of the London trams network.
- 2.1.4. Supplier assurance evidence will be produced to a timescale such that it supports the overall programme of delivery for the PPOS project.

3. Assumptions and Constraints

- 3.1.1. This TAP will be complimented by Safety Engineering assurance evidence delivered in compliance with the Supplier's systems, engineering and safety management plans. The supplier shall appoint an Independent Safety Assessor (ISA) to ensure the appropriate rigour is applied to safety management.

4. Definitions & Abbreviations

AIP	Acceptance in Principle
AoD	Approval of Design
AFT	Acceptance for Test
AoA	Acceptance of Asset
CDM	Construction (Design & Management) Regulations
DDA	Disability Discrimination Act (Equality Act)
DRA	Designers Risk Assessment
EMC	Electromagnetic compatibility
HO/HB	Hand Over / Hand Back
ICP	Independent Competent Person (as per ROGS definition)
ISA	Independent Safety Assessor
ITP	Inspection and Test Plan
LT	London Trams
MDL	Master Document List
MOD	Modifications Panel
PCCNs	Project Change Control Notification
PPOS	Physical Prevention of Over Speed system
RAMS	Reliability Availability Maintainability and Safety

RVAR	Rail Vehicle Accessibility Regulations
ROGS	Railway and Other Guided transport Systems
TAP	Technical Assurance Plan
TfL	Transport for London
WLAN	Wireless Local Area Network

5. Change Overview

5.1. The scope of the project will be broadly as follows;

5.1.1. Tram modifications:

- a. Install PPOS on tram equipment permitting speed monitoring and automatic brake application.
- b. Install PPOS on tram equipment permitting local event recording and subsequent data download.
- c. Install PPOS on tram communications equipment to allow event reporting to the LT Operational Control Room.
- d. Provide in cab PPOS health status indication.
- e. Provide on tram PPOS reset & inhibit functions.

5.1.2 Lineside modifications:

- a. Install tram energised track beacons at defined high risk locations.

5.1.2.1 Control Room modifications:

- a. Install PPOS event reporting equipment.
- b. Operating concept update.

5.1.2.2 Operational and Maintenance updates:

- a. Supply of PPOS maintenance training, spares and warranties.
- b. Update of existing maintenance task instructions to include PPOS.
- c. Supply of PPOS operational training.
- d. Update of existing operational task instructions to include PPOS.
- e. Asset modification and documentation updates to the LT Infrastructure management System (IMS).

6 Success Criteria

6.1 The success criteria for the project are:

- 6.1.2 Trams are modified such that when over speeding in defined high risk locations, the PPOS system causes them to be automatically braked to a standstill.
- 6.1.3 The PPOS system informs the driver of the system's health status via in cab indication.
- 6.1.4 In the event that the PPOS system causes a tram to be automatically braked the system will locally record the event data for subsequent download.
- 6.1.5 In the event that the PPOS system causes a tram to be automatically braked the system will report the event to the OCC.
- 6.1.6 Under the appropriate operational control, the PPOS system may be reset or inhibited by on tram controls.
- 6.1.7 Self powered track beacons are installed at defined high risk locations causing the PPOS system to automatically brake trams if an over speeding event is detected at that location.
- 6.1.8 The network Operating Concept is updated to include the existence, functionality and control of the PPOS system.
- 6.1.9 Operational and maintenance personnel are trained in the operation and maintenance of the PPOS system.
- 6.1.10 The LT IMS is updated to include the existence, functionality and control of the PPOS system.
- 6.1.11 An appropriate level of maintenance spares are provided to support the operation of the PPOS system.
- 6.1.12 Appropriate licensing and warranties are provided to support the operation of the PPOS system.

7 Interfaces

7.1 As a minimum, the project will interface with the following areas and systems/assets:

- 7.1.2 Rolling Stock

- 7.1.3 Depot facilities
- 7.1.4 Systems Integration Project
- 7.1.5 Trackside Infrastructure
- 7.1.6 Control Room environment
- 7.1.7 TOL Operational controls
- 7.1.8 Maintenance arrangements.

8 Organisational Arrangements

8.1 The project will be delivered by an appointed competent Supplier, overseen by the London Trams project team.

9 Roles & Responsibilities

9.1 The following personnel have responsibilities as part of the assurance of this change:

Role	Name	Responsibilities
The following roles are within the delivery team		
Delivery Manager	[REDACTED]	<ul style="list-style-type: none"> Development of this document. Delivery of the change, as specified by the Change Sponsor. Deliver the assurance evidence detailed in this document and the master document list. Risk management Ensure the roles within the delivery team are adequately resourced. Liaise with the Operations department Teams within LT and TOL.
Delivery Team Engineer(s)	TBA	<ul style="list-style-type: none"> Support for development of this document. Check the assurance evidence detailed in this document and the master document list, to ensure compliance with requirements, standards and BCPs. On site installation supervision and quality control.
Design Authority *	PPOS Supplier (TBA) [REDACTED]	<ul style="list-style-type: none"> Design acceptance, prior to submission for review.

MB

Role	Name	Responsibilities
Engineering Safety Manager (where applicable)	[REDACTED]	Engineering safety management activities to the satisfaction of TSG and the ICP.
Systems Integration Engineer/Manager (where applicable)		Systems integration management to the satisfaction of TSG.
Safety Manager **		Provide health and safety support.

Table 1: Delivery Team Roles & Responsibilities

* The Design Authority is normally the appointed Designer under CDM, or, if the works are not CDM notifiable, the party responsible for producing the design.

* The safety manager is the individual assigned to provide professional health and safety advice to the delivery team.

Role	Name	Responsibilities
The following roles are external to the delivery team		
Designated Competent Person(s)	[REDACTED]	Assist in development of this document. Review this document prior to each assurance gate. Review the assurance evidence detailed in this document and the master document list. Recommend the degree of acceptability of the assurance evidence on the Change Assurance Form. Attend MOD meetings.
Independent Competent Person (where applicable)		Safety Verification activities, as required by ROGS for significant risk changes.
Asset Manager (or representative)		Review all design documents and drawings. Support the handover and handback of assets.
Operations Representative		Review key documents from an operations and safety perspective. Support the handover and handback of assets.
Maintenance Representative		Support the handover and handback of assets.
MOD		Decide the assurance regime applicable to the change. Review reports and recommendations from ICPs at assurance gates. Make Go/ No Go decisions at assurance gate meetings.

Table 2: General Roles & Responsibilities

NE

10 Stakeholder Consultation

10.1 The purpose of stakeholder consultation is to ensure that the output requirements and the Specification will be delivered. The stakeholders for this change are as follows:

Stakeholder	Role	Name
LT	Delivery Manager	[REDACTED]
LT	Head of Engineering	
LT	Operations Manager	
LT	Director of LT	
LT	Asset Performance Engineer	
TOL	Trams Technical Change Management	
TOL	Operations Director Trams	
TOL	Director Trams	
UK Trams	Industry Trade Body	TBA
PPOS Supplier	Project Manager	TBA

Table 3: Stakeholders

10.2 The stakeholders also involved in formal design reviews are detailed in Section 9.

10.3 The PPOS Supplier shall provide the relevant documents to the applicable stakeholders. The Delivery Manager shall arrange for stakeholder reviews at each stage. All comments are to be collated and recorded on a single comment sheet by the Delivery Manager.

10.4 In all cases, a record of the stakeholder consultation undertaken with identified stakeholders will be held by the Delivery Manager. Records of stakeholder consultation may include meeting notes and written correspondence.

10.5 The identified stakeholders will be informed of the status of the change by the Delivery Manager, as a minimum, at each stage of progress through the assurance gates.

10.6 Prior to an assurance gate, the 'bars to acceptance' on the supporting assurance evidence will be cleared by the Supplier and 'comments for future action' minimised. The use of comments sheets will be in accordance with the following guidance:

- Bar to Acceptance – The change shall not progress through the next assurance gate until the bar to acceptance has been cleared or downgraded to a comment for future action or comment requiring no action.
- Comment for Future Action – The change may progress through the next assurance gate; however, the comment should be downgraded or cleared at either a future assurance gate or in the timescale specified in the comment.
- Comment Requiring No Action - The change may progress through the next assurance gate and the comment requires no action.
- Cleared – The comment has been resolved to the satisfaction of the stakeholder.

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10.7 Comments sheets and other evidence of stakeholder engagement will be provided to stakeholders for review prior to an assurance gate.

Bars to acceptance will only be used when:

The requirements of the Specification have not been satisfied

The requirements of relevant Standards have not been satisfied

There is an unacceptable risk to the safe and reliable operation of the railway

10.8 Where comments cannot be resolved to stakeholder's satisfaction, the Delivery Manager will escalate the matter to the Post Sandilands Programme Board.

11 Assurance Activities

11.1 Assurance Life Cycle

11.2 The project assurance life cycle to be satisfied by the Supplier is illustrated by the PPOS Assurance Path SLI-009-140 in Appendix A of this document. The following technical assurance gates are applicable to this change:

Acceptance in Principal
Acceptance of Design
Authority to Test (incl. Trial Operations)
Acceptance of Asset
Closure of Change

Table 4: Applicable Assurance Gates

Progressive assurance evidence will be provided to enable progress through each assurance gate. This evidence is detailed within the MDL in Schedule C of this document.

In addition, any derogation to the Standards will be presented to stakeholders for approval with the appropriate assurance information.

11.3 Assurance Structure

11.3.2 The scope of work to be delivered is delineated by the work packages below:

Work Activity No	Description	Detail

MG

WA1	Design and supply of the PPOS technical solution and products	WA1 shall include all design, assurance, supply, installation, integration, commissioning and documentation of the technical solution and products that form the PPOS system.
WA2	Vehicle installation design	Working to interface control and design documents developed under WA1. Detailed installation designs for both Bombardier and Stadler trams shall be completed and submitted for approval by the Employer and vehicle Design Authority.
WA3	Vehicle installation	Using documentation developed under WA1 and WA2, the Supplier shall undertake all installation for both Bombardier and Stadler trams, including configuration verification, validation and testing activities.
WA4	Infrastructure installation design	Working to interface control documents developed under WA1. Detailed installation design for both Lineside and Operational Control Room shall be completed and submitted for approval by the Employer.
WA5	Infrastructure installation	Using documentation developed under WA1 and WA4, the Supplier will undertake all infrastructure installation, verification, validation and testing activities, including configuration (if required) on LT tramway infrastructure, highways and Control Room
WA6	Independent Safety Assessment	<p>At his own cost, the Supplier shall provide an ISA to perform independent Safety Engineering validation and verification at each stage of the PPOS project lifecycle. The Supplier shall propose the ISA for the Employer's approval prior to the commencement of any design activities.</p> <p>The ISA shall independently assess and report on the adequacy and Safety Engineering aspects of the PPOS system designs at each stage of the project life cycle.</p> <p>Note: Yellow Book and IEC 61508 guidance for SIL2 identifies that the ISA shall be an independent department / person but is not strictly required to be an independent organization.</p>
WA7	Project management	The Supplier shall allocate sufficient project management and supervisory resources to ensure the coordination and delivery of all work activities for the duration of the PPOS project.

WA8	Documentation	The Supplier shall ensure that all work activities are fully documented in accordance with requirements in this specification
WA9	Training	The Supplier shall provide Operational and Maintenance Manuals and training materials for all aspects of PPOS Maintenance and Operation.
WA10	Spares, Warranty and Maintenance	<p>The Supplier shall provide an additional 10% of System components as Employer's spares on Employer's acceptance of the first PPOS commissioned tram meeting its reliability requirements.</p> <p>The Supplier shall provide a 24 month warranty period for the full PPOS system from the date of the final PPOS commissioned tram meeting its reliability requirements.</p> <p>The Supplier shall provide PPOS 2nd line maintenance, including fault diagnostics and component repair, for a 24 month period.</p>

The progressive structure of the assurance gates for each technical work package is detailed in Table 6 below, and in the PPOS Assurance Path SLI-009-140 within Appendix A of this document:

Approval in Principal - Work Packages WA1,WA2, WA4, WA6
Acceptance of Design - Work Packages WA1, WA2, WA4,WA6
Authority to Test - Work Packages WA3, WA5, WA6
Acceptance of Asset - Work Packages WA6
Closure of Change - Work Packages WA6, WA8,WA9, WA10

Table 6: Assurance Structure

11.4 Supplier Assurance Evidence Approvals

- 11.4.2 Supplier assurance evidence submissions for the change have been planned and recorded in the Master Document List (attached). The Master Document List will be used by the Delivery Manager as the mechanism to plan and track assurance submissions through the lifecycle of the change.
- 11.4.3 When Supplier assurance evidence for a particular assurance gate has been produced and checked within the delivery team, it will be submitted to the relevant stakeholders for review. Fourteen days will be allowed for stakeholder review. If the stakeholders cannot make a 'Go' or 'Go with conditions' recommendation, the stakeholders outstanding comments will be addressed and a revised submission provided. The process will be repeated until all stakeholders are satisfied as to the adequacy of the Suppliers assurance submissions.
- 11.4.4 Any conditions imposed by stakeholders will normally be addressed before the following stage in the assurance process.

11.5 Master Document List

- 11.5.2 The Master Document List (MDL) attached to this document describes the minimum assurance documents to be submitted at each assurance gate. The MDL will be updated by the Delivery Manager before each assurance gate to reflect documents submitted and their approval status.

The MDL may be updated at the discretion of the Delivery Manager as details of the Suppliers PPOS become known during design development. This is to ensure that the assurance of the PPOS remains suitably thorough and robust throughout the delivery process.

11.6 Verification and Validation

11.5.1 The arrangements for inspection and testing activities are to be detailed in Inspection and Test Plans (ITP) where required. If the ITP does not include the detailed test instructions and pass/fail criteria, then separate Test Instructions are to be produced to include that level of detail.

11.7 Migration to Operation

11.16.1 Migration to PPOS operational trial or final operation will be subject to:

- All relevant assurance approvals being gained prior to migration.
- All ITP tests passing
- Verification that all Employer's Requirements have been met.
- Receipt of an ISA report supporting the Engineering Safety elements of migration.

12 Risk Management

12.1 Risk Management Process

The risk management process will satisfy requirements from BS EN 50126.

12.1.2 In addition, Common Safety Method (CSM) principles will be applied where Engineering Safety Management is required.

Two types of risk will be managed through the life of the change;

(1) the risks associated with delivering the change (safety risks, hazardous events and operations, and risks to project delivery and quality), and

(2) the health and safety risks associated with operation and maintenance following acceptance of the assets into operational use

12.1.3 The Delivery Manager is responsible for managing all risks associated with this change and will populate and maintain a Risk Register, which will contain both types of risk.

12.1.4 All designers, suppliers, contractors, operators and maintainers will contribute to the Risk Register, including participation in workshops to identify and mitigate safety risks, hazardous events and operations, and risks to project delivery and quality . The Delivery Manager will ensure that the Risk Register is regularly updated.

12.1.5 Periodic reviews of the risk register will be held during the project lifecycle to ensure that all risks have been identified and are being appropriately managed. The Delivery Manager will review the risk register as part of the monthly reporting cycle to ensure that mitigating actions are being progressed and to identify the key risks. A formal review of risks will be undertaken prior to each Stage Gate and at least once each quarter.

12.2 Designer's Risk Assessment

12.2.2 The Supplier will generate a Designer's Risk Assessment (DRA) and will be responsible for maintaining the overall DRA associated with their scope of supply.

12.2.3 The DRA will cover the health and safety risks associated with implementing the change (buildability) and operation and maintenance following acceptance of the assets into operational use

12.2.4 The DRA will identify any impact on the LT Network Risk Model or Operational Risk Register. Any new risks, change in risk profile or change to mitigation will be notified to the Trams Head of Safety by the Delivery Manager.

12.2.5 Demolition and disposal risks will be assessed in the course of the design and detailed in the Health and Safety File.

12.3 Delivery Risk Assessment

12.3.2 For all Supplier's site works including installation and commissioning activities, the Supplier will undertake the appropriate hazard identification and risk assessment and record the results within a delivery risk assessment.

12.3.3 The delivery risk assessment will identify any impact on the Network Risk Model or the Operational Risk Register. Any new risks, change in risk profile or change to mitigation will be notified to the LT Head of Safety and changed by the Delivery Manager.