(g) the provision of training in accordance with clause 12 (*Training Services*) of this Agreement;

(h) the information, approvals, and/or other inputs that will be required by the Manufacturer from the Purchaser, Competent Authorities and/or other third Parties;

(i) the scheduled Milestone Payments as set out in Schedule 10 (*Milestones and Security*); and

(j) all other Plans and other strategies that are applicable that the Manufacturer is required to submit in accordance with this Agreement.

Additional Detail

6.4 On request by the Purchaser, the Manufacturer shall provide any additional detail, dates or individual programmes relating to a particular aspect of the Project Programme.

No Changes

6.5 The Project Programme shall not be changed without the Purchaser's prior written consent or in accordance with a Change Confirmation Notice.

7. Project Progress Reports

Project Progress Reports – General Requirements

7.1 (a) At the end of each Railway Period, the Manufacturer shall issue a report to the Purchaser by 12pm on the last Friday of each Railway Period. The report shall be in hard copy and electronic format showing actual progress by the Manufacturer for that Railway Period, and a forecast of the progress of the next Railway Period in connection with the Works and in satisfying the Assurance Regime and each of the other requirements specified in this Agreement (the ***Project Progress Report***).

(b) The first Project Progress Report shall be produced during the first whole Railway Period to occur after the Commencement Date and shall continue to be produced by the Manufacturer and submitted to the Purchaser in accordance with paragraph 7.1(a) until all Units have been Provisionally Accepted, or until all activities shown on the Project Programme are complete, whichever is the later.

(c) The Manufacturer shall ensure that each Project Progress Report continues to clearly identify the start and finish dates and the critical path for the design, manufacture, testing, commissioning and supply of the Units and Equipment and without prejudice to the foregoing, the matters set out in paragraph 6.3 of this Schedule 5.

(d) Where a Project Progress Report shows a delay or a potential delay against the Project Programme or any change in the dependencies associated with the Project Programme, the Manufacturer shall provide the Purchaser with a report (the ***Exception Report***), which shall include, the following:

(i) the extent of the delay or the potential delay and/or change and the potential impact on the Project Programme;

(ii) the reason for the delay or the potential delay and/or change;

(iii) the mitigation measures that the Manufacturer has taken or proposes to undertake to reduce the impact of the delay or the potential delay and/or change; and

(iv) the measures taken, and the measures proposed, to prevent recurrence of the event which caused the delay or the potential delay and/or change and/or similar such events in the future.

(e) The Manufacturer shall include a commentary in the Exception Report for any delayed tasks which are not on the critical path, but which have any potential to become a factor in timescales specified in the Project Programme.

(f) The Manufacturer acknowledges and agrees that no Project Progress Report or any other provision in this paragraph 7.1 shall:

(i) constitute a Change under the Change Procedure; or

(ii) entitle the Manufacturer to an extension of time to the Contractual Acceptance Date or otherwise entitle the Manufacturer to any adjustment to the Project Programme.

Content of Project Progress Report

7.2 The Manufacturer shall ensure that each Project Progress Report contains the information described in this paragraph 7.2. The Project Progress Report shall confirm where activities are proceeding as planned, and provide a commentary on any matters of exception. The Project Progress Report shall include:

(a) the current Project Progress Report;

(b) the Exception Report (as appropriate);

(c) a confirmation that the design, manufacture, testing, commissioning and supply of the Units and Equipment is proceeding in accordance with the Project Programme, including the process for obtaining Relevant Approvals (other than as disclosed in the Exception Report);

(d) the Risk Management Report;

(e) commentary on any activities where the Manufacturer considers that any problems may arise, including:

(i) the reason for the problem;

(ii) the extent of the problem and the potential impact on the delivery of any item of Purchased Equipment;

(iii) the mitigation measures that the Manufacturer has taken or proposes to undertake to reduce the impact; and

(iv) the measures taken, and the measures proposed, to prevent recurrence of the event which caused the problem and/or similar such events in the future;

(f) the physical status of each Unit in respect of the design, manufacture, testing, commissioning and supply stages;

(g) a report on the performance of the in-service Units (while the manufacture of the remaining Units is still in progress);

(h) subject to any obligations of confidentially to which the Manufacturer is subject, a section highlighting any defects or design, maintenance or operational issues that have arisen in any analogous rolling stock manufactured (or being manufactured) by the Manufacturer or in any rolling stock of which it has knowledge, that may occur or otherwise affect the Units;

(i) progress with the submissions of all plans, strategies, programmes and procedures required by this Agreement; and

(j) Assurance Acceptance metrics.

Additional Reports

7.3 Without prejudice to the foregoing, the Purchaser shall have the right, acting reasonably, to request additional management reports from the Manufacturer setting out specific details in relation to the Works. The Manufacturer shall provide any such additional report to the Purchaser as soon as reasonably practicable.

8. Project Review Meetings

Project Review Meetings

8.1 (a) The Parties shall hold a review meeting in relation to the Project Progress Report and related matters once every Railway Period or more frequently upon the request of either Party (the ***Project Review Meeting***).

(b) The Purchaser shall circulate an agenda prior to each Project Review Meeting, and the Manufacturer shall be entitled to call for the addition of agenda items before or at the commencement of the Project Review Meeting. The agenda circulated prior to each Project Review Meeting shall include specific matters to include, inter alia, those items listed in paragraph 7.2. The Manufacturer shall be entitled to call for the addition of agenda items before or at the commencement of the meeting.

(c) The primary purpose of the Project Review Meeting shall be to:

(i) monitor the Manufacturer's performance against the requirements of this Agreement;

(ii) monitor the activities at the interface between the Manufacturer and the Purchaser and between the Manufacturer and the Operator; and

(iii) provide a focal point for the resolution of any problems or issues.

8.2 The Project Review Meeting shall achieve the purposes specified in paragraph 8.1(c) by:

(a) reviewing the Project Progress Report and referring to the Execution Plan in order to:

(i) compare activity progress against the Project Programme and discuss any variances;

(ii) determine whether any further remedial or mitigation actions are needed to correct variances; and

(iii) ensure that appropriate responsibility for actions is agreed;

(b) reviewing quality, safety and technical matters to ensure that the Equipment will comply with this Agreement;

(c) reviewing the status of any Changes;

(d) identifying matters which could potentially affect the Manufacturer's performance of its obligations under the Agreement; and

(e) identifying any major concerns regardless of source and ensuring that appropriate actions are agreed to facilitate resolution of such concerns.

8.3 Each Project Review Meeting shall take place at the TfL Group offices or such other place as specified by the Purchaser, in each case with reasonable notice to the Manufacturer in advance of the relevant Project Review Meeting.

8.4 The Purchaser Contract Manager and the Manufacturer Contract Manager shall both attend the Project Review Meeting unless otherwise agreed by the Parties. Other employees, agents and/or contractors of each Party including Key Subcontractors and other employees, agents and/or contractors of the TfL Group may attend a Project Review Meeting. The Purchaser has the right, acting reasonably, to require the attendance of any relevant Subcontractor of the Manufacturer at a Project Review Meeting.

8.5 The Parties shall maintain an open and co-operative relationship in order to promote the success of the Project Programme and delivery of the Units.

8.6 The Purchaser shall chair the Project Review Meeting and shall produce and circulate the minutes promptly after the completion of each Project Review Meeting.

Subcontractor Meetings

8.7 The Manufacturer shall advise the Purchaser of any meetings between itself, Subcontractors, suppliers and/or any Competent Authority concerning the subject matter of this Agreement. The Purchaser or its nominee reserves the right to attend any or all such meetings, to the extent reasonably necessary (such right is not, for the avoidance of doubt, to include meetings between the Manufacturer and its Subcontractors and suppliers relating to their commercial relationship).

Liaison Meetings

8.8 The Manufacturer shall, from time to time, attend additional liaison meetings as required by the Purchaser, as part of a process of assuring the Purchaser that the obligations of the Manufacturer under this Agreement are being achieved. Such meetings are expected to be held with, inter alia, any Infrastructure Manager(s) and other stakeholders and are expected to cover design, manufacture, statutory body approval, testing and commissioning and the introduction of Units into service.

9. Execution Plan

9.1 The Manufacturer shall document its high level plan for delivering the Works including, but not limited to:

(a) how the Manufacturer will manage its performance of the Works (the ***Management Plan***);

(b) the Manufacturer's management structure accountable and responsible for delivering all facets of the Works, including the names of Key Post holders and their curricula vitae (***Management Structure***). The Management Structure shall include the key interfaces with, inter alia, the Purchaser, Infrastructure Managers, regulatory and approving bodies and other stakeholders and Key Subcontractors;

(c) how the Manufacturer will supervise and manage subcontractors during the design, manufacturing and testing stages (***Supplier Management Plan***);

(d) its plan for quality management in respect of the Works (the ***Quality Management Plan***), including the requirements set out in paragraph 10 and how the Manufacturer's procedures as set out in the Quality Management Plan will be applied to each stage of the Works and harmonised across multiple design, manufacturing and testing sites, where applicable;

(e) how the Manufacturer will mobilise and organise sufficient appropriately qualified and experienced staff and manage the Unit engineering and design teams. The Manufacturer shall state the principal locations where engineering and design teams are located (***Engineering and Design Management Plan***). The Engineering and Design Management Plan shall include the level of engineering and design support to be given to production, reassembling, testing and commissioning operations;

(f) how the Manufacturer will mobilise and organise sufficient appropriately qualified and experienced staff and suitable facilities of the required capacity for the manufacture of the Units and Equipment (other than the Manufacturer Fit Out Assets). The Manufacturer shall state the principal locations where Unit manufacturing (including the Manufacturer's Works) will take place (***Construction Management Plan***). The Construction Management Plan shall clearly describe when, and at which location, Vehicles will be brought together to form Units;

(g) how the Manufacturer will implement procedures that will progressively assure the Purchaser that the Works are delivered in compliance with the

requirements of this Agreement (the ***Compliance Assurance Plan***), and including the programme for and processes to be used to manage Assurance Acceptance submissions in accordance with Schedule 6 (*Assurance Acceptance*);

(h) how the Manufacturer will comply with the technical assurance requirements of Schedule 6 (the ***Technical Assurance Plan***);

(i) how the Manufacturer will mobilise and organise sufficient appropriately qualified and experienced staff and suitable facilities of the required capacity for the Factory Acceptance Testing of the Units and Equipment. The Manufacturer shall state the principal locations for where the Factory Acceptance Tests for Vehicles and Units shall be performed (***Factory Acceptance Test Plan***);

(j) a description of the Manufacturer's strategy for obtaining all Relevant Approvals to permit Units to operate or test, as required, on the LO Infrastructure, and in unrestricted passenger service in accordance with this Agreement (***Relevant Approvals Management Plan***);

(k) the Manufacturer's strategy for delivery, commissioning and Pre-Provisional Acceptance and Provisional Acceptance of the Units and Equipment Acceptance of the Equipment (***Provisional Acceptance Management Plan***). The Provisional Acceptance Management Plan shall set out acceptance activities and locations;

(l) the Manufacturer's strategy for achieving Final Acceptance and Fleet Acceptance in accordance with the Project Programme (***Final and Fleet Acceptance Management Plan***);

(m) how the Manufacturer will develop the Manuals and Training Materials and how training will be delivered in accordance with this Agreement for the Units and Equipment (***Unit and Equipment Manuals and Training Plan***);

(n) how the Manufacturer will develop the Simulator design and programming in accordance with this Agreement (***Simulator Development Plan***); and

(o) identification and mitigation of technical and commercial project risks during the Project Programme (***Risk Management Plan***), changes to be made to the Risk Management Plan only with the approval of the Purchaser, and reporting relating to those risks to be in accordance with paragraph 11 (*Risk Management Plan*),

together forming the ***Execution Plan***.

9.2 The Manufacturer shall submit the Execution Plan to the Purchaser no later than one month after the Commencement Date and shall promptly update and re-issue to the Purchaser in the event of any amendments to the Execution Plan.

10. Quality Management Plan

10.1 The Quality Management Plan shall form part of the Execution Plan and shall include, but not be limited to, the Manufacturer's:

(a) quality policy;

(b) quality management organisation;

(c) quality management systems for, inter alia:

(i) project and programme/schedule management;

(ii) design;

(iii) construction;

(iv) testing;

(v) delivery of the Purchased Equipment;

(vi) management of change and non-conformities; and

(vii) project reporting;

(d) information technology and document control and retention procedures;

(e) process for the selection of suppliers and subcontractors;

(f) quality performance indicators;

(g) quality system review and continuous improvement processes;

(h) inspection and quality assurance processes (including suppliers and subcontractors);

(i) auditing requirements and methods;

(j) non-conformance and corrective action processes;

(k) risk management processes;

(l) customer complaints handling process; and

(m) other applicable quality procedures and all other relevant quality matters envisaged by this Agreement.

10.2 The quality management systems referred to in paragraph 10.1(c) above shall be certified to ISO 9001 (or equivalent) and the Manufacturer shall provide supporting evidence satisfactory to the Purchaser of such certification.

11. Risk Management Plan

Within five Working Days of the last Friday of each Railway Period, the Manufacturer shall prepare and submit to the Purchaser a risk management report (***Risk Management Report***) by reference to the Risk Management Plan reporting on

actual performance for that Railway Period since the submission of the Risk Management Report relating to the preceding Railway Period.

12. Reporting on Health, Safety and Environmental Matters

Throughout the term of this Agreement the Manufacturer shall report on health and safety and environmental matters in accordance with clause 42.1 and clause 42.3.

Appendix 1
Key Posts

Each position identified in the table below is a Key Post and the person named in respect of each Key Post shall carry out such role unless otherwise agreed in accordance with paragraph 3 (*Organisational Arrangements*) of this Schedule 5:

Key Post	**Name**
Manufacturer Contract Manager*	Philip Hennessey
Manufacturer Project Manager*	Steve Till
Manufacturer Project Director	Bruno Poschmann
Manufacturer Engineering Manager (during design)*	Marc Phillips
Engineering Safety Manager	Phil Garner
Engineering Safety Assessor	Mick Underwood
Project Quality Manager	Fabian Malfilatre

* denotes each Key Post which will be based at the Project Office during the time of engagement in managing the Works.

REDACTED

Schedule 6
Assurance Acceptance

Appendix 1: Permitted Design Changes

Appendix 2: Vehicle Design Area Breakdown Structure

Appendix 3: Hazard Management Procedure

Appendix 4: System Safety Plan – Contents

Appendix 5: Bid Reliability Growth Commitment

Appendix 6: Table of Assurance Acceptance Submissions

1. Definitions

For the purposes of this Schedule 6 the following words and expressions shall have the following meanings:

Assessment Body means any duly accredited entity appointed by the Manufacturer as an independent assessment body pursuant to the CSM Regulation;

Change Control Process has the meaning given to such term in paragraph 9.2(a) of this Schedule 6;

Close-Out Meeting means a meeting between the Parties at the end of each Stage Gate Review;

Configuration Management Strategy has the meaning given to such term in paragraph 9.1(b) of this Schedule 6;

Contracting Entity has the meaning given to such term in the Interoperability Regulations;

Detailed Unit Design means the detailed design of the Units and the production of each of the items described in paragraph 11.7(a) of this Schedule 6;

Detailed Unit Design Phase means that part of the Unit Design Phase commencing on the expiry of the Preliminary Unit Design Phase and ending on the date of the notice served by the Purchaser pursuant to paragraph 11.7(a) of this Schedule 6;

Detailed Unit Design Submissions has the meaning given to such term in paragraph 11.7(a) of this Schedule 6;

EMC has the meaning given to such term in the Train Technical Specification;

EMC Management Plan has the meaning given to such term in paragraph 5.4(a) of this Schedule 6;

EMI has the meaning given to such term in the Train Technical Specification;

ESM means engineering safety management;

Hazard Log has the meaning given to such term in paragraph 9.4 of this Schedule 6;

Hazard Management Procedure means the procedure for the management of hazards and safety risks set out in the document which comprises Appendix 3 (*Hazard Management Procedure*) to this Schedule 6 as the same may be amended from time to time;

IHA means interface hazard analysis;

Preliminary Unit Design means the preliminary design of the Units and the production of each of the items described in paragraph 11.6(a) of this Schedule 6;

Preliminary Unit Design Phase means that part of the Unit Design Phase starting on the Commencement Date and ending on the date of the notice served by the Purchaser pursuant to paragraph 11.6(b) of this Schedule 6;

Preliminary Unit Design Submissions has the meaning given to such term in paragraph 11.6(a) of this Schedule 6;

RAM means reliability, availability and maintainability;

Request for Review means a document of that name in the form agreed between the Parties from time to time requesting the Purchaser to review certain documents for Assurance Acceptance;

Requirements Management System has the meaning given to such term in paragraph 9.9(a) of this Schedule 6;

RAM Management Plan has the meaning given to such term in paragraph 8.2(e) of this Schedule 6;

Safety Authorisation has the meaning given to such term in ROGS;

Safety Requirements Specification means the safety requirements specification that the Manufacturer may prepare in accordance with paragraph 3 of Appendix 4 (*System Safety Plan - Contents*) of this Schedule 6;

System Safety Plan has the meaning given to such term in paragraph 5.1(a) of this Schedule 6;

Stage has the meaning given to such term in paragraph 8.1(c) of this Schedule 6;

Standards Matrix has the meaning given to such term in paragraph 9.7(a) of this Schedule 6;

TAP means the rolling stock technical assurance plan to be provided by the Manufacturer pursuant to paragraph 3.1(b) of this Schedule 6;

Technical Case has the meaning given to such term in paragraph 4.2(a) of this Schedule 6;

Technical Case Plan is the rolling stock technical case plan to be provided by the Manufacturer pursuant to paragraph 4.1 of this Schedule 6;

TC Component has the meaning given to such term in paragraph 4.2(b) of this Schedule 6;

Unit Design Management Plan has the meaning given to such term in paragraph 11.2 of this Schedule 6;

Unit Design Phase means the period starting on the Commencement Date and ending on the date of the notice served by the Purchaser pursuant to paragraph 11.7(b) of this Schedule 6 and includes the Preliminary Unit Design Phase and the Detailed Unit Design Phase;

Unit Design Submission Programme has the meaning given to such term in paragraph 11.5(b) of this Schedule 6;

Vehicle Design Area Breakdown Structure means the document set out in Appendix 2 (*Vehicle Design Area Breakdown Structure)* to this Schedule 6 as may be amended in accordance with this Agreement; and

Verification and Validation Strategies has the meaning given to such term in paragraph 7.1 of this Schedule 6.

2. Assurance Acceptance Process

2.1 Where the Manufacturer is required to submit information, drawings and/or documents to the Purchaser for Assurance Acceptance, the Manufacturer shall comply with the requirements described in this paragraph 2. Any plan, programme, strategy or other document of the Manufacturer that is included in a schedule as at the Commencement Date shall be deemed to have been Assurance Accepted in the form included in this Agreement but this is without prejudice to (i) the obligations of the Manufacturer to revise and/or resubmit such document for Assurance Acceptance as required by this Agreement; and (ii) the requirements of this Agreement generally.

2.2 The Manufacturer shall ensure that each drawing, document, report and/or other information submitted to the Purchaser for Assurance Acceptance shall be in accordance with the requirements of paragraph 5 (*Communications and Document Control*) of Schedule 5 (*Contract Management*) and is accompanied by a Request for Review.

2.3 The Manufacturer shall ensure that each Request for Review contains, to the extent applicable, the following information:

(a) the submission number (which shall be independent of any drawing number);

(b) the drawing and/or document number, including where relevant the revision letter or number;

(c) the drawing title and/or title of the document;

(d) the date of submission;

(e) any supplementary information which is reasonably necessary to enable the Purchaser to make a decision in accordance with paragraph 2.5 (including, where relevant, a description of the latest revision).

Where the Purchaser has received drawings, documents and/or information that have been submitted for Assurance Acceptance in accordance with the requirements of this paragraph 2, the Purchaser shall promptly acknowledge receipt of such submission in writing.

2.4 The Manufacturer shall be responsible for ensuring that the Purchaser receives each submission made by the Manufacturer for Assurance Acceptance (as evidenced by the Manufacturer receiving acknowledgement of receipt from the Purchaser and the date on which the Purchaser signs a copy of the Request for Review shall be the date on which, for the purposes of this paragraph 2, the Purchaser shall be deemed to have received the submission for Assurance Acceptance.

2.5 Within 20 Working Days of the date the Purchaser receives a submission from the Manufacturer for Assurance Acceptance (or such later date as notified to the Manufacturer in accordance with paragraph 2.6) the Purchaser shall review and comment on the information, drawing and/or document that has been submitted or re-submitted by the Manufacturer and return one copy of the Request for Review stamped or marked:

"Category I — No Assurance Acceptance";

"Category II — Assurance Acceptance granted with comments"; or

"Category III — Assurance Acceptance granted".

2.6 Where the Purchaser, acting reasonably, considers that the complexity, detail, scope and/or nature of the drawings, documents and/or information submitted by the Manufacturer for Assurance Acceptance means that it may not be able to respond to the Manufacturer within 20 Working Days of receipt by it of such submission, the Purchaser shall be entitled to an additional period of time to consider the submission provided that the Purchaser notifies the Manufacturer in writing within seven Working Days of the date the Purchaser received the submission that the Purchaser is exercising its rights under this paragraph 2.6. Each notice served by the Purchaser pursuant to this paragraph 2.6 shall specify:

(a) the details of the relevant submission;

(b) the additional period of time required by the Purchaser; and

(c) a description in reasonable detail as to the reasons why the additional time is required.

2.7 The Manufacturer shall undertake the following actions in relation to the information, drawing and/or document (as the case may be) that has been returned to it by the Purchaser in accordance with paragraph 2.5 and subject to the provisions of paragraph 2.11:

(a) if such information has been stamped "Category I — No Assurance Acceptance", the Manufacturer shall immediately review and revise the relevant drawing, documents and/or information taking into account and incorporating the comments made by the Purchaser pursuant to paragraph 2.5 and shall resubmit such information for Assurance Acceptance by the Purchaser in accordance with this paragraph 2;

(b) if such information has been stamped "Category II — Assurance Acceptance granted with comments", the Manufacturer shall be entitled to proceed on the basis of the drawing, documents and/or information as amended to incorporate the comments made by the Purchaser and re-submitted for Assurance Acceptance by the Purchaser pursuant to paragraph 2.5; and

(c) if such information has been stamped "Category III — Assurance Acceptance granted", the Manufacturer shall be entitled to proceed on the basis of drawings, documents and/or information submitted to the Purchaser.

2.8 If the Purchaser does not respond within the timeframe set out in paragraph 2.5, the Manufacturer shall be entitled to treat the information submitted to the Purchaser as "Category III – Assurance Acceptance granted" provided that the Purchaser has signed and returned a copy of the Request for Review to acknowledge receipt under paragraph 2.3 in respect of that submission for Assurance Acceptance.

2.9 Unless otherwise required by the Purchaser, the Manufacturer shall only be required to submit one example of any sample, pattern or model in any request for Assurance Acceptance.

2.10 The Purchaser shall be entitled, at any time and on reasonable notice (and in any event not less than two Working Days from the date of such notice) to:

(a) request the Manufacturer to submit any further document, information, design, drawing, calculation, schedule, sample, pattern or model necessary to clarify, support and/or justify any submission for Assurance Acceptance; and

(b) (acting reasonably) require the Manufacturer to attend a meeting to discuss any aspect of the drawings, documents and/or information submitted for Assurance Acceptance,

and the Manufacturer shall comply with any such request from the Purchaser.

2.11 When considering which category of response to give to a submission by the Manufacturer for Assurance Acceptance, the Purchaser shall not comment adversely on any submission if and to the extent the content of such submission is in accordance with the Train Technical Requirements, Applicable Laws and Standards, Good Industry Practice and the provisions of this Agreement. Otherwise, the Manufacturer agrees to incorporate all comments made by the Purchaser before re-submitting any drawing, document or information for Assurance Acceptance.

2.12 Where indicated in the Agreement, the Manufacturer shall not proceed without Assurance Acceptance having first been obtained. Where it is not stated that Assurance Acceptance must be obtained before action may be taken, the Manufacturer may proceed without Assurance Acceptance being granted but it shall do so at its own risk.

2.13 No comment, stamping, marking or categorisation of any information, drawing or document shall diminish or relieve the Manufacturer from any of its obligations under this Agreement nor shall such comment, stamping, marking or categorisation be an the Purchaser Change nor shall it permit the Manufacturer to any costs, relief or compensation of any kind.

2.14 Unless expressly stated otherwise the Manufacturer shall not be entitled to amend any Assurance Accepted document in any manner or form without obtaining prior Assurance Acceptance to such amendment.

3. Technical Assurance Plan

Generally

3.1 (a) During the Assurance Period, the Manufacturer shall in performing its obligations under this Agreement implement and manage a process of Progressive Assurance in order to demonstrate to the Purchaser that the Manufacturer is complying with the requirements of the Agreement in respect of design, manufacture, testing, commissioning and supply of the Units and the Equipment.

(b) The Manufacturer shall provide to the Purchaser for Assurance Acceptance within three months of the Commencement Date, a technical assurance plan in respect of the design, manufacture, testing, commissioning and supply of the Units and the Equipment containing the information set out in paragraph 3.2 of this Schedule 6.

(c) Once the technical assurance plan referred to in paragraph 3.1(b) has been Assurance Accepted, it shall be the ***TAP*** for the purposes of this Agreement.

(d) During the Assurance Period, the Manufacturer shall review and update the TAP from time to time, including as a minimum at the end of each Stage, so that the TAP shall satisfy at all times the requirements set out in this Schedule 6. Where the Manufacturer has updated or otherwise amended the TAP, it shall submit the modified TAP to the Purchaser for Assurance Acceptance.

Technical Assurance Plan

3.2 (a) The TAP shall describe the systems engineering techniques (including the engineering "V" life-cycle model prepared in accordance with paragraph 8.1(b)) and the manner in which the concept of Progressive Assurance will be implemented by the Manufacturer to systematically manage the risks described in paragraph 8.1(a) and provide the necessary assurance to the Purchaser.

(b) The TAP shall consist of the following:

(i) Technical Case Plan (described in paragraph 4) which shall include the System Safety Plan;

(ii) Verification and Validation Strategies (described in paragraph 7);

(iii) an engineering "V" life-cycle model and associated Stage Gate Reviews (described in paragraph 8);

(iv) the management processes to be adopted by the Manufacturer in implementing Progressive Assurance (described in paragraph 9);

(v) a programme for the submission by the Manufacturer of the information and/or documentation that will be submitted to the Purchaser for Assurance Acceptance (described in paragraph 3.2(e)(i)); and

(vi) an organisation chart together with CVs of the key staff responsible for technical and Progressive Assurance (described in paragraph 3.2(f)).

(c) The management processes mentioned above shall include as a minimum:

(i) configuration management (as described in paragraph 9.1);

(ii) technical change control (as described in paragraph 9.2);

(iii) defect and corrective action reporting (as described in paragraph 9.3);

(iv) hazard management (as described in paragraphs 9.4 and 9.5);

(v) systems interface management (as described in paragraph 9.6);

(vi) standards management (as described in paragraph 9.7);

(vii) requirements management (as described in paragraph 9.9); and

(viii) document management.

(d) The TAP shall be consistent with, and take into account, all railway approval processes required by all Applicable Laws and Standards and conform to the requirements of any Relevant Approvals.

(e) The TAP shall contain:

(i) a programme for the submission by the Manufacturer of the information and/or documentation that will be submitted to the Purchaser for Assurance Acceptance. The Manufacturer shall ensure that, to the fullest extent possible, the programme is structured to: (A) allow regular intervals between the submission of information and/or documents to the Purchaser; (B) take into account any timeframes and/or approval periods specified in any Applicable Laws and Standards; and (C) be consistent with the Project Programme.

(ii) It is a requirement that the Manufacturer audits its own internal engineering safety management activities and those of any Subcontractors or suppliers, as appropriate. The Manufacturer shall integrate such engineering safety management auditing within the overall quality management system for the Works and the results of such audits shall be submitted to the Purchaser for Assurance Acceptance. These arrangements shall be confirmed in the System Safety Plan and the programme described in paragraph (i).

(f) The TAP shall contain an organisation chart setting out:

(i) details of each key staff member of the Manufacturer who will be responsible for technical and Progressive Assurance, supported by CVs, details of qualifications and explanations as to how their experience is adequate for the competency requirements of the proposed role; and

(ii) the manner in which those employees will be independent from the Manufacturer's project team undertaking the design, manufacture, testing, commissioning and supply of the Units and Equipment.

4. The technical case plan

Technical Case Plan

4.1 The technical case plan (the ***Technical Case Plan***) shall:

(a) describe the manner in which the Manufacturer shall demonstrate to the reasonable satisfaction of the Purchaser that each TC Component technical case satisfies the relevant requirements specified in this Agreement;

(b) identify the information and/or evidence that will need to be provided and at which Stage a particular piece of information and/or evidence will be able to be included in an Technical Case;

(c) describe how each TC Component technical case will combine with the others to deliver the Technical Case in respect of the Works;

(d) include the System Safety Plan as described in paragraph 5.1; and

(e) include the EMC Management Plan as described in paragraph 5.4.

Technical Cases

4.2 (a) The Manufacturer shall be responsible for preparing the rolling stock technical case (***Technical Case***)

(b) The Technical Case shall consist of a technical case in respect of each of the Units and the Equipment. The Unit technical case and the Equipment technical case shall, in turn, be composed of a number of technical cases in respect of the necessary Parts and Subsystems (each a ***TC Component***).

(c) The Manufacturer shall ensure that each TC Component technical case contains or references such information and other evidence as is necessary to demonstrate to the Purchaser's reasonable satisfaction that the Equipment and the Units and their Parts and Subsystems comply with:

(i) the Train Technical Requirements;

(ii) all Applicable Laws and Standards and Relevant Approvals; and

(iii) all other requirements set out in this Agreement.

(d) Each TC Component technical case relating to the design shall be submitted as part of the Preliminary Unit Design Submissions and Detailed Unit Design Submissions in accordance with paragraphs 11.6 and 11.7.

(e) In preparing the Technical Case the Manufacturer shall provide evidence that the Units (and their constituent TC Components technical cases) and the Equipment comply with all relevant safety requirements including all Applicable Laws and Standards. This evidence shall include a Certificate of Verification and Technical File issued by the Notified Body and the

Designated Body and a Verification Declaration issued by the Manufacturer (in its capacity as Contracting Entity under the Interoperability Regulations) in relation to the Units.

(f) Each TC Component technical case and the Technical Case will have two main parts:

(i) the first part will show how the Unit, Part, Subsystem or Equipment design satisfies each of the requirements set out in the Train Technical Requirements, complies with all Applicable Laws and Standards and Relevant Approvals and the other requirements of this Agreement; and

(ii) the second part will contain an appropriate series of processes to be executed by trained, experienced and competent personnel.

(g) The Manufacturer shall ensure that each TC Component technical case and the Technical Case is supported by evidence that demonstrates to the reasonable satisfaction of the Purchaser that each TC Component satisfies the requirements of this Agreement relevant to that TC Component.

(h) Where:

(i) a TC Component is an existing component in use in another application and has (where required for that passenger service) Relevant Approvals for such use; and

(ii) the Manufacturer is able to demonstrate to the reasonable satisfaction of the Purchaser that the technical, safety and operational functions of the TC Component in respect of the other application are the same as those specified in the Train Technical Requirements,

the Manufacturer shall be entitled to submit as supporting evidence to the TC Component technical case any certificates, consents, approvals and/or other equivalent information provided by a Notified Body or Designated Body or a Competent Authority and/or any other evidence acceptable to the Purchaser (acting reasonably) in respect of that TC Component.

(i) Where the Manufacturer submits the Technical Case to the Purchaser for Assurance Acceptance at the end of each Stage the Manufacturer shall ensure that such submission is accompanied by evidence of independent peer review of the Technical Case.

(j) The Manufacturer shall manage each TC Component technical case and progressively revise the Technical Case at the end of each Stage to satisfy the requirements of Progressive Assurance throughout the Assurance Period.

Technical Case Management

4.3 Without prejudice to the Manufacturer's obligations under this Schedule 6 and Schedule 5 (*Contract Management*), the Manufacturer shall implement management systems that are compatible with standard commercially available software which enables the information and/or evidence produced by the Manufacturer in its TC

Component technical cases to be used and edited by the Purchaser. The Manufacturer shall cooperate with the Purchaser to mitigate any incompatibility between the Purchaser's and the Manufacturer's respective management systems.

Review of Technical Cases

4.4 (a) The Manufacturer shall submit at each Stage the Technical Case to the Purchaser for Assurance Acceptance before proceeding to the next Stage and on the dates shown in the Project Programme. Each Technical Case submitted to the Purchaser shall be progressively revised to include additional information and/or evidence that has been obtained during each of the Stages prior to the Technical Case being submitted to the Purchaser for Assurance Acceptance.

(b) In undertaking Assurance Acceptance of a Technical Case, the Purchaser shall be entitled to review all evidence included or referenced in the Technical Case and on request by the Purchaser, the Manufacturer shall provide copies of such evidence to the Purchaser in a timely manner.

(c) The verification of each Technical Case by the Purchaser shall be based upon the evaluation of the information and/or evidence contained in the Technical Case that shows that each TC Component technical case satisfies all the requirements relevant to that TC Component.

5. System Safety Plan

5.1 (a) The rolling stock system safety plan (the ***System Safety Plan***) shall consist of the contents set out in Appendix 4 (*System Safety Plan – Contents*) of this Schedule 6 which shall include:

(i) safety policy and strategy;

(ii) scope of the System Safety Plan;

(iii) safety requirements;

(iv) safety analysis methodology;

(v) safety justification strategy;

(vi) approval process;

(vii) safety approval of Modifications;

(viii) operation and maintenance performance;

(ix) control of safety interfaces; and

(x) Subcontractor safety management.

(b) Suitable and sufficient risk assessments shall be prepared by the Manufacturer throughout the Project as are necessary to support the required safety deliverables. Risk assessment strategies shall be included in the System Safety Plan.

(c) The Manufacturer shall describe within the System Safety Plan how the relationships with the following are to be managed and coordinated:

(i) the commonality between engineering safety and RAM in line with BS EN 50126;

(ii) how human factors integration, together with the supporting analyses, will be accounted for within the engineering safety management activities; and

(iii) how the safety of the systems, Subsystems, etc is to be demonstrated prior to testing and commissioning activities.

Management of interfaces

5.2 (a) The Manufacturer acknowledges and agrees that the management of interfaces is a particular issue affecting the safety of the rail industry. The Manufacturer shall produce a description of each of the interfaces including where appropriate those with Infrastructure Managers, other users of the LO Infrastructure, neighbours of the LO Infrastructure and neighbouring railways and other delivery partners and submit the same to the Purchaser for Assurance Acceptance by no later than four months after the Commencement Date.

(b) The Manufacturer shall demonstrate to the Purchaser that all the risks associated with the interfaces described in paragraph 5.2(a) have been reduced to a level as low as reasonably practicable in the Technical Case. The Manufacturer will perform and report on an interface hazard analysis (*IHA*) to set out how the engineering safety implications at internal and external interfaces will be adequately addressed and managed. The IHA will involve all relevant interfacing contractors, third Parties and the Purchaser.

(c) In each safety analysis and assessment conducted by the Manufacturer, the Manufacturer shall consider the interface between the design of the Units and the LO Infrastructure. In particular the Manufacturer shall ensure that the design of the Units shall not adversely affect the ability of the Operator to obtain the Operator's Safety Certificate in relation to operating the Units on the LO Infrastructure or adversely affect the ability of the Infrastructure Manager of any LO Infrastructure to obtain Safety Authorisation for the operation of that section of the LO Infrastructure.

(d) The Manufacturer shall provide to the Purchaser all necessary evidence of safety adequacy to assist the Purchaser or the Operator to secure authorisation to operate the railway in accordance with the Applicable Laws and Standards. To facilitate this, the Manufacturer shall be required to make presentations to and secure acceptance of the evidence of engineering safety from the Purchaser and the appropriate approvals bodies.

Independent safety auditing and assessment

5.3 (a) The Manufacturer shall, at its own cost, establish and implement independent safety auditing and assessments of its work and practices in accordance with all Applicable Laws and Standards.

(a) The Manufacturer shall appoint a Notified Body (***NoBo***) and Designated Body (***DeBo***) to assess conformity of the systems and Subsystems etc with the applicable TSIs and NNTRs, and to prepare the necessary Technical Files to evidence this.

(b) The Manufacturer shall comply with the CSM Regulation to demonstrate the safety adequacy of the systems and Subsystems etc. of the Works.

(c) The Manufacturer shall make available to the Purchaser on a progressive basis, the evidence of conformity with the TSIs and NNTRs to support safety assurance activities under the CSM Regulation.

(d) The Manufacturer shall, as required by the CSM Regulation, appoint an Assessment Body to confirm the engineering safety assurance of the systems, Subsystems etc is in conformance with the principles of the CSM Regulation.

(e) The Manufacturer will fully cooperate with the Assessment Body and provide the engineering safety evidence necessary to carry out this assessment, and comply with any improvements to assure the Manufacturer's conformance with the CSM Regulation.

(f) The Manufacturer shall have carried out an independent review of the Technical Cases. An independent review is required for design and final engineering safety justification(s) prepared by the Manufacturer. These arrangements shall be described in the System Safety Plan.

(g) The findings of all reviews shall be formally reported and made available to the Purchaser within 30 days of the review being completed.

Electromagnetic compatibility

5.4 (a) The Manufacturer shall prepare a rolling stock EMC management plan (the ***EMC Management Plan***) which shall describe the Manufacturer's approach to EMC and provide evidence to assure the Purchaser that:

(i) the Units comply with Applicable Laws and Standards relating to EMC;

(ii) the Units comply with the Train Technical Specification;

(iii) compatibility is achieved with the LO Infrastructure and neighbouring railways; and

(iv) the Units are not adversely impacted by the external EMC environment.

(b) The EMC Management Plan shall include but not be limited to the following:

(i) the Industry Standards to be adopted;

(ii) the arrangements for EMC surveys and coupling studies;

(iii) the proposals for an EMI hazard analysis and EMI hazard log;

(iv) details of the degraded modes and fault conditions to be assessed within the overall EMC strategy;

(v) an EMC test plan; and

(vi) arrangements for liaison and exchange of information with the Purchaser and other relevant entities.

6. Unit Log Book

6.1 The Manufacturer shall be responsible for the production and maintenance of a log book for each Unit (***Unit Log Book***), which shall be in both hard copy and electronic form, the format of which shall be agreed between the Parties prior to the Manufacturer commencing manufacture of the first Unit and the content shall include as a minimum the following details for each Vehicle:

(a) build records including technical data such as reference sheets for build records, dimensional and setting checks and for signed-off inspection and Factory Acceptance Test documentation including EMC testing;

(b) equipment serialisation of serial-numbered components (including mechanical, pneumatic and electrical items and any other items agreed between the Parties) and configuration charts;

(c) reference sheets for functional test records;

(d) reference sheets for Type Test records;

(e) reference sheets for commissioning test records and records of maintenance carried out by the Manufacturer prior to Acceptance;

(f) the status of Modifications, Mandatory Modifications and Changes, including records of Software version numbers;

(g) certificates issued by any NoBo, DeBo or Assessment Body and the Statements of Compatibility;

(h) records of Fault Free Running tests;

(i) records of any agreed derogations or concessions;

(j) work required to be carried out prior to Provisional Acceptance of a Unit; and

(k) status of fleet checks applicable to that Unit.

6.2 Each reference sheet relating to testing in a Unit Log Book shall include, as a minimum, the following information:

(a) the date of each test;

(b) the test procedure number and issue level for the relevant test; and

(c) the result of that test.

6.3 The Manufacturer shall note in the relevant Unit Log Book any Preconditions that have been notified to it by the Purchaser pursuant to clause 15.12 of the Agreement.

7. Verification and validation strategies

7.1 The TAP shall include a set of verification and validation strategies for each of the TC Component technical cases that describe the means (whether by testing, certification or otherwise) by which the Manufacturer proposes to demonstrate to the Purchaser that a particular requirement (whether statutory, regulatory, contractual or otherwise) has been satisfied (***Verification and Validation Strategies***).

7.2 Demonstration of safety adequacy of the systems, Subsystems, etc shall be carried out in compliance with the CSM Regulation and the ORR Guidance on the Application of the Common Safety Method on Risk Evaluation and Assessment (December 2012) as the same may be updated from time to time.

8. Progressive assurance

Engineering "V" Life-Cycle

8.1 (a) During the Assurance Period the Manufacturer shall implement systems engineering techniques to control and reduce the risks associated with the interaction between the Units, LO Infrastructure and their effective integration. The Manufacturer shall perform its obligations under this Agreement in a manner that minimises, to the extent reasonably practicable, such risks and facilitates the Acceptance of the Units.

(b) In performing its obligations under this Agreement during the Assurance Period the Manufacturer shall implement an engineering "V" life-cycle model in accordance with BS EN 50126: 1999 (Railway Applications — The specification and demonstration of Reliability, Availability, Maintainability and Safety).

(c) In complying with paragraph 8.1(b) the Manufacturer shall conduct reviews (***Stage Gate Reviews***) at the end of each of the stages that it has identified in its engineering "V" life-cycle model (each one a ***Stage***) in respect of the design, manufacture, testing, commissioning and supply of the Units and the Equipment so as to ensure that Progressive Assurance is being conducted effectively.

As a minimum the Manufacturer shall conduct a Stage Gate Review at the end of each of the following Stages in the order that they occur in the Project Programme:

(i) Preliminary Unit Design (as described in paragraph 11.6);

(ii) Detailed Unit Design (as described in paragraph 11.7);

(iii) commencement of Type Testing of the first Unit (as a complete train set);

(iv) commencement of operation of a Unit under its own power on the LO Infrastructure (for whatever purpose);

(v) Provisional Acceptance of the first AC Only Unit and the first Dual Voltage Unit to be Provisionally Accepted and in the case of any Units extended as part of an Option, the first Unit of that particular Option to be Provisionally Accepted;

(vi) Final Acceptance of the first AC Only Unit and the first Dual Voltage Unit to be Finally Accepted and in the case of any Units extended as part of an Option, the first Unit of that particular Option to be Finally Accepted; and

(vii) Fleet Acceptance.

(d) As part of the systems engineering techniques implemented by the Manufacturer pursuant to paragraph 8.1(a), the Manufacturer shall at the end of each Stage undertake as part of the Stage Gate Review an interdisciplinary review of each Subsystem, so as to ensure its effective integration and/or interaction with the other Subsystems and so that evidence is available to confirm to the reasonable satisfaction of the Purchaser the completion of all of the deliverables and any outstanding issues for the relevant Stage.

(e) The Manufacturer shall prepare a progressive ESM report to confirm the acceptable status of engineering safety management activities. This report shall be updated as necessary and presented as part of the Stage Gate Review.

(f) The Manufacturer shall notify the Purchaser in writing when it has completed a Stage Gate Review and upon receipt of such notice the Purchaser shall promptly arrange a Close-Out Meeting with the Manufacturer to confirm that all relevant deliverables and outstanding issues (if any) have been completed to the reasonable satisfaction of the Purchaser.

(g) The Manufacturer shall assist the Purchaser with (i) the integration of the Units and the LO Infrastructure; and (ii) the commencement of passenger services by the Purchaser. Such assistance shall include as a minimum, and without prejudice to clause 9.3 of the Agreement or the requirements of Schedule 5 (*Contract Management*):

(i) the provision of requested information and data (including interface data) to the Purchaser;

(ii) the review of information and data (including interface data) provided by the Purchaser; and

(iii) the attendance by the Manufacturer (and, where appropriate, any of its Key Subcontractors) at meetings with any of the Purchaser and the Operator.

Reliability and Resilience

8.2 (a) All aspects of the design and manufacture of the Unit and its Subsystems shall be demonstrably undertaken in a way that delivers the required MDBSAF, as described in the Train Technical Specification. The Manufacturer shall provide to the Purchaser for Assurance Acceptance a plan (the ***Reliability Growth Plan***) setting out how the Manufacturer will meet its Unit reliability obligations and shall include a MDBSAF prediction (which will be no worse than the reliability growth commitment that the Manufacturer submitted to the Purchaser in response to the Invitation to Negotiate as attached at Appendix 5 (*Bid Reliability Growth Commitment*) to this Schedule 6) for each Railway Period from the first Railway Period after the Railway Period in which the seventh Unit is scheduled to achieve QPAC/PAC.

(b) The Manufacturer shall take into consideration the effect of potential failures of all assets, corrective and preventive maintenance times and redundancies built into the design.

(c) Overall achievement of the reliability requirements is dependent on the performance of the interfaces between the Works and the LO Infrastructure. The Manufacturer's interface management with others shall include RAM performance at interfacing points.

(d) The Manufacturer shall follow the approach of BS EN 50126:1999 "Railway applications - The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)".

(e) The Manufacturer shall prepare a rolling stock reliability, availability and maintainability management plan (the ***RAM Management Plan***) to detail how it will comply with the RAM requirements of BS EN 50126 and to identify the process for demonstrating that the RAM requirements are met.

(f) This RAM Management Plan shall describe the following as a minimum:

(i) organisation of the RAM team including the position within the Manufacturer's organisation for the Works;

(ii) management of RAM-related interfaces with the LO Infrastructure;

(iii) provisions and procedures for providing feedback to and interacting with other disciplines in the Manufacturer's team, e.g. safety engineering, design, maintenance and commissioning;

(iv) planned RAM assessments to demonstrate that the system RAM requirements are met by the Manufacturer design;

(v) RAM methods to be used;

(vi) management of Subcontractors' RAM requirements;

(vii) verification and validation of assessments, including data;

(viii) validation of RAM requirements during manufacture, installation, commissioning and maintenance;

(ix) record keeping of RAM assessments;

(x) high level schedule for deliverables; and

(xi) RAM demonstration plan.

(g) The RAM Management Plan shall be submitted to the Purchaser for Assurance Acceptance within three months of the Commencement Date.

(h) Any further revisions to the RAM Management Plan shall be submitted to the Purchaser for Assurance Acceptance.

9. Progressive assurance management

Configuration Management

9.1 (a) The Manufacturer shall establish, implement and maintain a configuration management system that complies with the requirements of ISO 10007:2003 (Quality management systems – Guidelines for configuration management).

(b) The TAP shall contain a strategy that describes the configuration management system proposed to be established and implemented by the Manufacturer in accordance with paragraph 9.1(a) (***Configuration Management Strategy***).

Technical Change Control

9.2 (a) During the design life, the Manufacturer shall establish and implement a process (***Change Control Process***) that is consistent with the Change Procedure and the process for implementing Permitted Design Changes pursuant to clause 10.6 of the Agreement. The Change Control Process shall enable the Manufacturer to manage, in a structured manner, any change to the scope, function, timeframes, cost and/or any technical aspect of the Units or any item of Equipment as a result of a Change or otherwise. The TAP shall describe the Change Control Process to be implemented by the Manufacturer.

(b) The Manufacturer shall ensure that the Change Control Process includes a process for the categorisation of technical changes which is consistent with the Vehicle Design Area Breakdown Structure and the Technical Case Plan.

(c) Where a document, drawing and/or other information that has been granted Assurance Acceptance by the Purchaser requires amendment in connection with a Change, a Permitted Design Change or other requirement of this Agreement, the Manufacturer shall make such amendments as it considers necessary and submit the amended drawing, document and/or information to the Purchaser for Assurance Acceptance.

Defect and Corrective Action Recording

9.3 (a) During the Assurance Period, the Manufacturer shall establish and implement a defect and corrective action recording system that records and enables

analysis of all relevant information and data created by the Manufacturer and/or its Subcontractors in performing its obligations under this Agreement.

(b) The Manufacturer shall ensure that it records all actual or suspected errors, non-conformances, failures, defects, incidents and accidents arising in relation to, or in connection with, any Units or item of Equipment and/or any process relating to the design, manufacture, testing, commissioning and supply of any Unit or item of Equipment together with details of any remedial actions taken by the Manufacturer and/or its Subcontractors and such information shall be provided to the Purchaser on request.

(c) The TAP shall describe the process for this defect and corrective action recording system to be implemented by the Manufacturer.

Hazard Management

9.4 (a) The Manufacturer's Hazard Management Procedure shall be created in accordance with GE/GN8640 Guidance on Planning an Application of the Common Safety Method on Risk Evaluation and Assessment, and is attached, in a form submitted to the Purchaser in response to the Invitation to Negotiation, at Appendix 3 (*Hazard Management Procedure)* to this Schedule 6.

(b) The Purchaser shall establish a hazard log as the means of managing all hazards and safety risks (the ***Hazard Log***). The Purchaser shall retain possession of the Hazard Log and shall provide reasonable access to the Manufacturer to such Hazard Log upon being given reasonable prior written notice (and in any event not to be less than two Working Days from the date of receipt of such notice).

(c) The Manufacturer shall use the Hazard Log in accordance with the Hazard Management Procedure to track and manage those hazards which have been properly allocated to it in accordance with the Hazard Management Procedure. For the design life, the Manufacturer shall submit to the Purchaser any new hazards identified in accordance with the Hazard Management Procedure.

Hazard allocation and the ALARP principle

9.5 (a) Where a hazard has been allocated in accordance with the Hazard Management Procedure, as the sole responsibility of the Manufacturer, the Manufacturer shall be required, in accordance with the requirements of this Agreement to demonstrate that it has managed the risks associated with the hazard such that those risks are "as low as reasonably practicable" (***ALARP***).

(b) Where a hazard has been allocated in accordance with the Hazard Management Procedure as being the responsibility of the Manufacturer and another person, the Manufacturer shall be responsible for co-operating and acting reasonably to reach agreement with that other person as to an appropriate strategy for managing the risks associated with the hazard such that those risks are ALARP.

Systems Integration and Interface Management

9.6 (a) During the Assurance Period, the Manufacturer shall establish and implement a systems integration management process that enables it to demonstrate compatibility of the Units, Parts and Subsystems with all parts of the LO Infrastructure and record all actions that are necessary arising from any incompatibility;

(b) Upon request, the Manufacturer shall provide information in relation to systems integration and its management process to the Purchaser for the purposes of Progressive Assurance.

(c) The Manufacturer shall work iteratively with all relevant third Parties in order to manage all system interfaces with the Units.

Standards Management

9.7 During the Assurance Period, the Manufacturer shall establish and implement a standards management process that:

(a) includes the creation and maintenance of a matrix that lists all Industry Standards that apply to the performance by the Manufacturer of its obligations under this Agreement (***Standards Matrix***);

(b) includes a process for the establishment and subsequent management of recording changes to the Industry Standards using the Standards Matrix to identify the Industry Standards that have changed after a specified date and the version of each Industry Standard being complied with by the Manufacturer at any point in time; and

(c) enables evidence of compliance by the Manufacturer with each of the Standards listed in the Standards Matrix to be provided as part of a Technical Case.

9.8 The Manufacturer shall include the standards management process it has established in accordance with paragraph 9.7 as part of the TAP.

Requirements management

9.9 (a) During the Assurance Period, the Manufacturer shall establish and implement a management system that records the Manufacturer's compliance with each of the requirements set out in the Train Technical Requirements and, where appropriate, to generate more detailed requirements to be used in the design of the Units (***Requirements Management System***).

(b) The Manufacturer shall ensure that the Requirements Management System is consistent with the requirements of clause 10.6, including the right of the Purchaser to make Permitted Design Changes to the Train Technical Requirements.

10. Unit design obligations

10.1 The Manufacturer shall:

(a) prepare the Detailed Unit Design in accordance with the requirements of this Agreement;

(b) ensure that the Detailed Unit Design will enable the Works to comply with the requirements of the Train Technical Specification and, subject thereto, will meet the requirements of the Manufacturer Train Proposal;

(c) comply with the checking and safety audit procedures set out in Schedule 5 (*Contract Management*) are complied with; and

(d) comply with the Quality Management Plan.

11. Unit design assurance

11.1 Throughout the Unit Design Phase the Manufacturer shall use Progressive Assurance to demonstrate to the reasonable satisfaction of the Purchaser that the proposed design of the Units and the Equipment satisfies the requirements specified in the Train Technical Requirements.

Unit design Management Plan

11.2 The Manufacturer shall prepare a Unit design management plan (the ***Unit Design Management Plan***) which shall, as a minimum, contain:

(a) the Unit design strategy, which will describe how the Manufacturer will produce an integrated, assured, certified design;

(b) the design organisation the Manufacturer plans to put in place to undertake the Unit design;

(c) the Vehicle Design Area Breakdown Structure as described in paragraph 11.4;

(d) the Unit Design Submission Programme as described in paragraph 11.5; and

(e) the Unit design review and verification procedures and the link with the Stage Gate Reviews.

The Unit Design Management Plan shall be submitted to the Purchaser, for Assurance Acceptance, within four weeks from the Commencement Date and any further revisions to the Unit Design Management Plan shall be submitted to the Purchaser for Assurance Acceptance.

Unit Design Phases

11.3 (a) In order to gain sufficient assurance that the design meets the Purchaser's requirements, the Manufacturer shall submit design information to the Purchaser in a two stage process as follows:

(i) a Preliminary Unit Design Phase; and

(ii) a Detailed Unit Design Phase.

(b) The detailed scope of each of the Preliminary Unit Design Phase and the Detailed Unit Design Phase is described below in paragraphs 11.6 and 11.7 respectively.

(c) The Permitted Design Changes which may be notified by the Purchaser to the Manufacturer in accordance with clause 10.6 of the Agreement are set out in Appendix 1 (*Permitted Design Change*) to this Schedule 6.

Vehicle Design Area Breakdown Structure

11.4 The Manufacturer represents and warrants to the Purchaser that:

(a) the Vehicle Design Area Breakdown Structure (at Appendix 2 (*Vehicle Design Area Breakdown Structure*) to this Schedule 6 constitutes the complete design of the Vehicles that will comprise the Units broken down into discrete design areas (each a ***Vehicle Design Area***); and

(b) the scope of each Vehicle Design Area has been chosen in order that the design of the Vehicles may be fully reviewed in discrete manageable packages in the necessary detail required by the Purchaser.

Unit Design Submission Programme

11.5 The Unit Design Submission Programme shall include, as a minimum, the following:

(a) a description of the mechanical and/or electrical systems and other Subsystems covered by each Vehicle Design Area; and

(b) a programme for the preparation and completion of the design of the Units (***Unit Design Submission Programme***) which:

(i) is consistent with the Project Programme and indicates the proposed dates when the Manufacturer intends to submit the Preliminary Unit Design Submissions and the Detailed Unit Design Submissions to the Purchaser for Assurance Acceptance; and

(ii) indicates the proposed duration of the Preliminary Unit Design Phase and the Detailed Unit Design Phase.

Preliminary Unit Design Phase

11.6 (a) During the Preliminary Unit Design Phase, the Manufacturer shall submit the relevant submissions (***Preliminary Unit Design Submissions***) to the Purchaser for Assurance Acceptance in accordance with the Unit Design Submission Programme. The Preliminary Unit Design Submissions shall include, as a minimum, each Technical Case, updated to show the current status of the information and evidence described in the Technical Case in respect of the Preliminary Unit Design and to the extent not expressly addressed in the Technical Cases shall include:

(i) a list of the requirements to be adopted by the Manufacturer in undertaking the design of the Units and the Equipment;

(ii) a justification that the requirements specified in paragraph (i) are consistent with the Train Technical Requirements and all Applicable Laws and Standards that the Manufacturer proposes to comply with in designing, manufacturing, commissioning and testing the Units and the Equipment;

(iii) a description of the overall concept of the design together with evidence that it satisfies the requirements specified in paragraph (i);

(iv) the manner in which the requirements specified in paragraph (i) will be verified;

(v) an up-to-date list of the Key Subcontractors and any other important subcontractors or suppliers that will be involved in the design, manufacture, commissioning, testing and supply of the Units and the Equipment;

(vi) a summary of any new or novel technology to be utilised in the Units and evidence that such technology does not materially affect the risk of the Manufacturer being unable to perform its obligations under this Agreement; and

(vii) a list of the principal interfaces with the Unit design.

(b) Where the Manufacturer has submitted each of the Preliminary Unit Design Submissions, and such Preliminary Unit Design Submissions have each been granted Assurance Acceptance by the Purchaser, the Parties shall hold a Close-Out Meeting. Unless agreed by the Parties at the Close-Out Meeting held pursuant to this paragraph 11.6(b), no later than five Working Days after the completion of the Close-Out Meeting the Purchaser shall notify the Manufacturer in writing that the Preliminary Unit Design Phase has been completed, together with any outstanding Purchaser comments to be addressed by the Manufacturer pursuant to the Assurance Acceptance process.

Detailed Unit Design Phase

11.7 (a) During the Detailed Unit Design Phase the Manufacturer shall submit the submissions described in this paragraph 11.7(a) (***Detailed Unit Design Submissions***) to the Purchaser for Assurance Acceptance in accordance with the Unit Design Submission Programme. The Detailed Unit Design Submissions as a minimum shall include each Technical Case updated to show the current status of the information and evidence described in the Technical Case in respect of the Detailed Unit Design and, to the extent not expressly addressed in the Technical Cases or earlier design review/submission, shall include:

(i) visual representations, the Mock-Up and any further mock-ups in sufficient detail to allow the detailed review of the design of the Units and the Equipment by the Purchaser;

(ii) evidence that the design of the Units and the Equipment satisfies the Train Technical Requirements, Applicable Laws and Standards and the other requirements specified in this Agreement;

(iii) design assurance documentation to the reasonable satisfaction of the Purchaser and, if part of the design is service-proven, previous service history and evidence in accordance with paragraph 4.2(h) and other supporting evidence as described in that paragraph to demonstrate that the part of the design is compatible with the intended application; and

(iv) evidence that the Unit design and Maintenance Plan are compatible with each other.

(b) Where the Manufacturer has submitted each of the Detailed Unit Design Submissions and each such Detailed Unit Design Submission has been granted Assurance Acceptance by the Purchaser, the Parties shall hold a Close-Out Meeting. Unless agreed by the Parties at such Close-Out Meeting, no later than five Working Days after the Close-Out Meeting, the Purchaser shall notify the Manufacturer in writing that the Detailed Unit Design Phase has been completed.

Appendix 1
Permitted Design Changes

Permitted Design Changes	Design Freeze Date
Passenger Information System – format, wording and triggering of messages (audio and visual)	11.07.16
Selective Door Opening System – platform length settings per station	11.07.16
Traction Power Limit Settings	11.01.16
Train Management System – wording of alarms, prompts and messages	11.07.16
Train Management System – prioritisation and routing of alarms and messages	11.07.16
Saloon HVAC system – setting of temperatures and timing of energy-saving modes	11.01.16
Cab HVAC system – setting of temperatures and timing of energy-saving modes	11.01.16
Passenger loadweighing – format and routeing of data outputs	11.07.16
Interior & Exterior Schedule of Finishes, comprising; • Cab seat trim fabric, colours and pattern • Cab desk and interior panelling colours and application • Cab flooring colour and pattern • Cab fittings; materials and colours • Cab signage; type and location • Saloon flooring colours and patterns • Saloon interior panelling colours and application • Inter-car gangway colour • Saloon seats trim fabric, colours and patterns • Saloon fittings including grab poles and rails materials and colours • Saloon signage- mandatory and branding; type and location • Exterior Livery colours and application • Exterior signage- mandatory and branding;	11.01.16

Permitted Design Changes	Design Freeze Date
type and location.	
Driving Cab ergonomics/human factors and desk equipment layout (where not mandated by Standards)	11.01.16
Exterior design: cab cosmetic design	11.01.16
Interior design, comprising;	
• Passenger seating configuration (within Train Technical Requirements constraints)	11.01.16
• Passenger operated controls and communication devices- location and integration into the interior design	11.01.16
• Longitudinal seat detail design principles	11.01.16
• Transverse seat detail design principles	11.01.16
• Tip up seat detail design principles	11.01.16
• Grab pole/ hand rail/ handhold form and detail design principles	11.01.16
• Draught screen form and detail design principles	11.01.16
• Advert card holder design	11.01.16
• Passenger information display –integration into the interior design	11.01.16
• Electronic advertising display –integration into the interior design	11.01.16
• Key/Lock types- passenger/crew areas	11.01.16
• Simulator – simulation environments	11.01.16
• Simulator – parameters for functions and scenarios	11.01.16
• Simulator – simulated faults	11.01.16
• Simulator – training reports content and format	11.01.16

REDACTED

Appendix 2
Vehicle Design Area Breakdown Structure

Section C

Part C 1.1.5 Vehicle Design Area Breakdown Structure

Bombardier will apply its proven Vehicle Architecture approach to the New Rolling Stock for London Overground project, enabling the effective management of all technical requirements. This system will ensure all areas of requirement are fully considered, have an allocated engineer with responsibility for their management and build on the substantial experience gained across our portfolio of projects, such as the Class 378, Class 172 and Class 379 projects.

A. Introduction

Bombardier has developed the Vehicle Architecture approach, to enable the creation of a structure that collates all technical requirements for a project and enables their effective management. The Vehicle Architecture enables the Unit to be broken down into discrete design areas which are used to manage all aspects of the engineering. These design areas also provide the structure for the Assurance and Approval documentation throughout the project.

The Vehicle Architecture approach has been successfully implemented to recent projects including Technical Assurance and to achieve Approvals (Authorisation) on LU projects, Class 378, Class 172 and Class 379 projects.

At the start of the project, a Vehicle Architecture will be established, this diagram shows the structure of the design and the engineering work. It enables responsibilities to be allocated (i.e. an engineer will own an area of design and achievement of the associated requirements), and ensures all areas of requirements and designs are fully considered. The Vehicle Architecture is also used to make comparisons between projects, which enables areas of novelty to be identified and focused on during the project (i.e. it facilitates the management of technical risk).

Bombardier has a standard Vehicle Architecture, which is customised for each project depending on the vehicle design and characteristics of that project.

Each area of the Vehicle Architecture will be allocated an owner within the Engineering organisation. The Architecture will be used to structure the Requirements Management database and the Descriptive Bill of Materials.

Features	Benefits
The application of the *Bombardier* Generic Vehicle Architecture designed to manage rolling stock projects in discrete Vehicle design packages.	The Vehicle Architecture has been successfully utilised on recent new build projects to provide structure and management of requirements, the emerging design, and assurance and approvals submissions. The management of design areas utilising this architecture has been accepted by several NoBos, DeBos and ISAs as a structured method for managing the requirements and conformance evidence.
Design areas are included for vehicle level and functional elements of the rolling stock design rather than only procured systems and components.	The successful integration of systems is critical in the design of the Unit. The three tiered architecture ensures that the core integration requirements are understood, documented and managed effectively so that the Unit functionality can be progressively assured and delivered.

Section C

Part C 1.1.5 Vehicle Design Area Breakdown Structure

This is the Bombardier proposal that contains the information necessary to address this section of the customer proposal template as set out in "Part C, Section 1.5: Vehicle Design Area Breakdown Structure (Bidder Drafted Contract Document MSA Schedule 6 (Assurance Acceptance) – Appendix 2)" (referred to within this document by the Bombardier term 'Vehicle Architecture').
Bombardier has developed the Vehicle Architecture over a number of recent EMU projects to create a structure that ensures that all the applicable technical requirements for a project are managed. The structure was primarily defined to manage requirements, but the same structure is also applied to design activities (e.g. structuring design reviews and technical cases) and validation activities.

Section B explains the Vehicle Architecture.

Section C contains the Vehicle Architecture for New Rolling Stock for London Overground Project Units.

Section D further describes the scope of those design areas on the Vehicle Architecture where the scope may not be wholly apparent from the design area description.

A1 References

1. S.I. 2011 No. 3066 The Railways (Interoperability) Regulations 2011

A2 Definitions

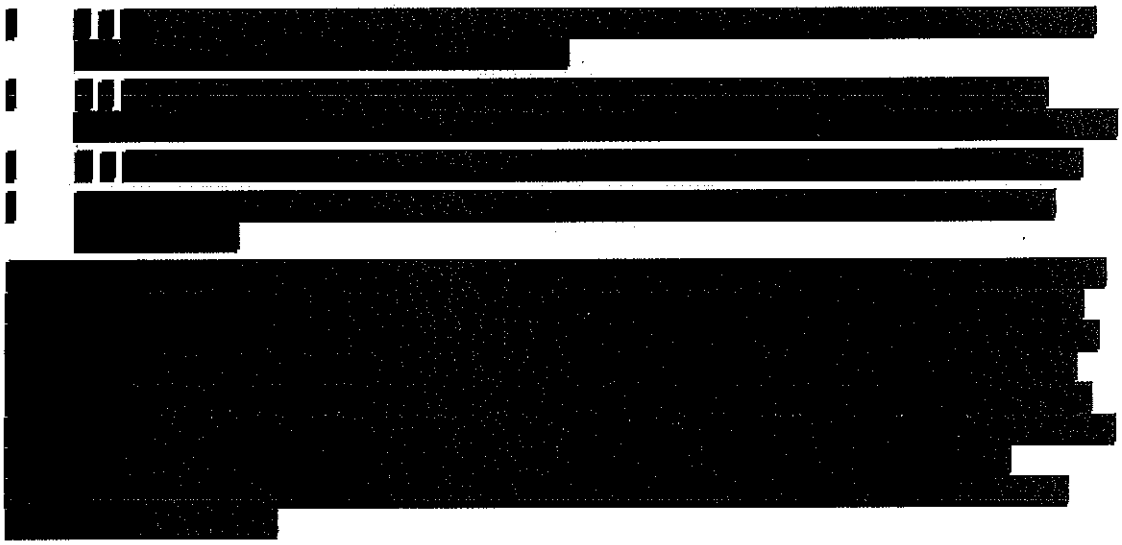
Abbreviation	Definition
Authorisation	The process whereby rolling stock is permitted to enter passenger service by the ORR as defined in the Interoperability regulations [1].
Assurance	A risk based approach for progressively demonstrating that the Units meet the technical requirements.
Requirements	The requirements captured in the DOORS database where an assessment of conformance is required.
(Rolling Stock) Technical Case	The documentation that provides the assurance evidence of the RfL requirements in the Technical Specification
the Unit(s)	The Units for the New Rolling Stock for London Overground Project
Vehicle Architecture	A structure developed to manage requirements, design and validation activities. Note: this is the term used within Bombardier to describe the vehicle design area breakdown structure.

B.

[redacted]

Section C

Part C 1.1.5 Vehicle Design Area Breakdown Structure



C. The Vehicle Architecture

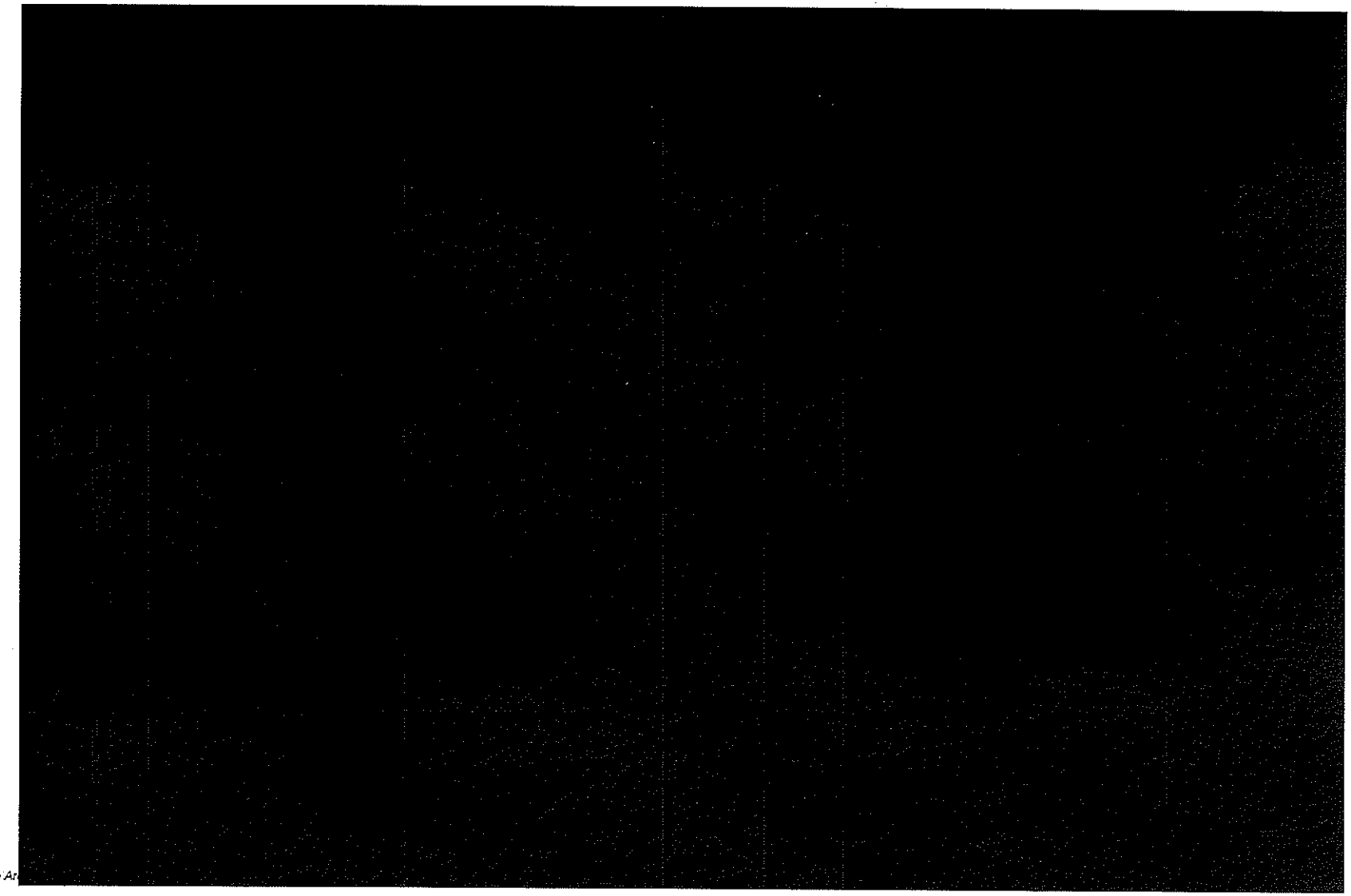


Figure 1: Vehicle Ar

D. Clarification of Design Areas

[redacted]

D1 R > Railway design areas

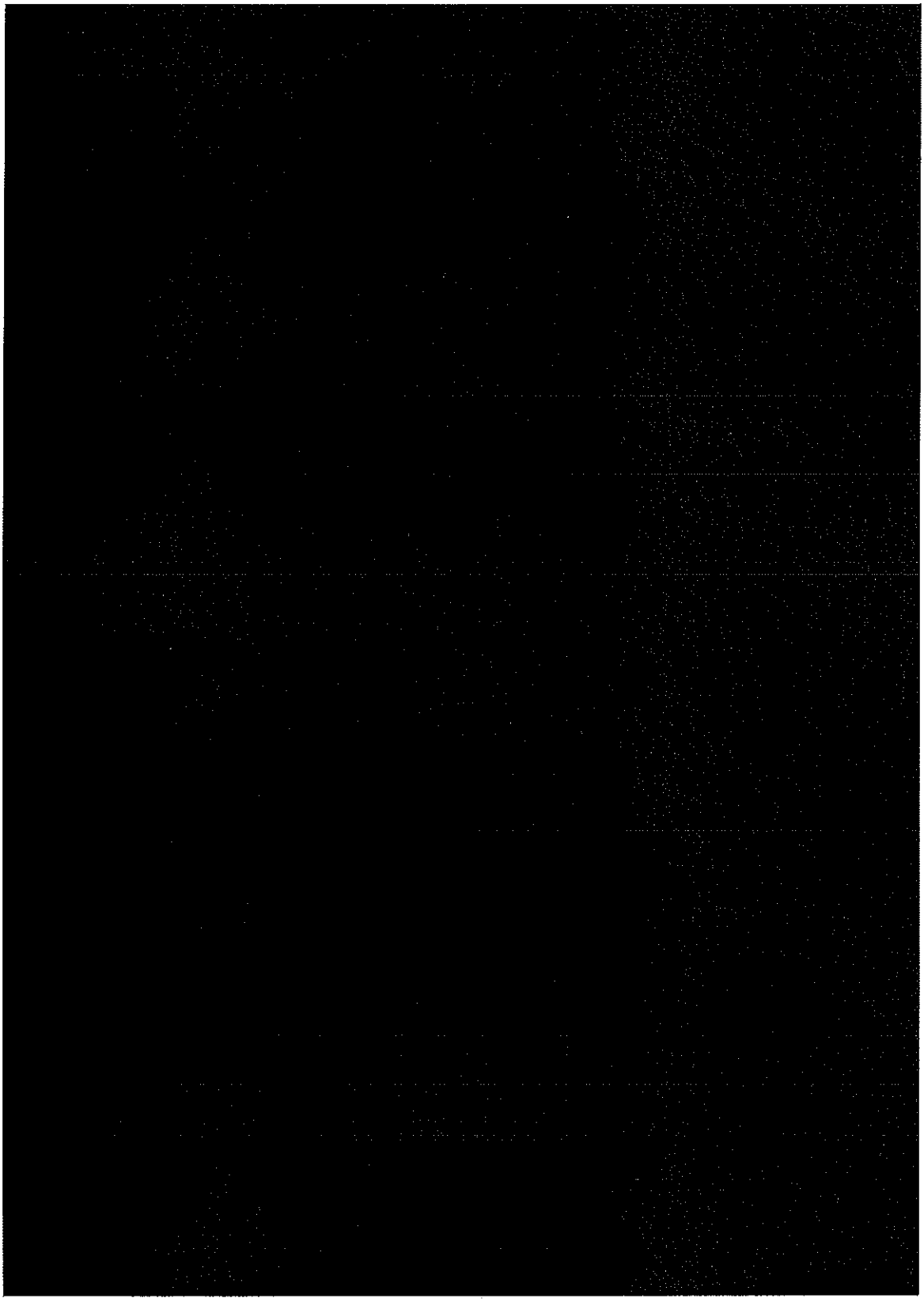
[redacted]

D2

D3

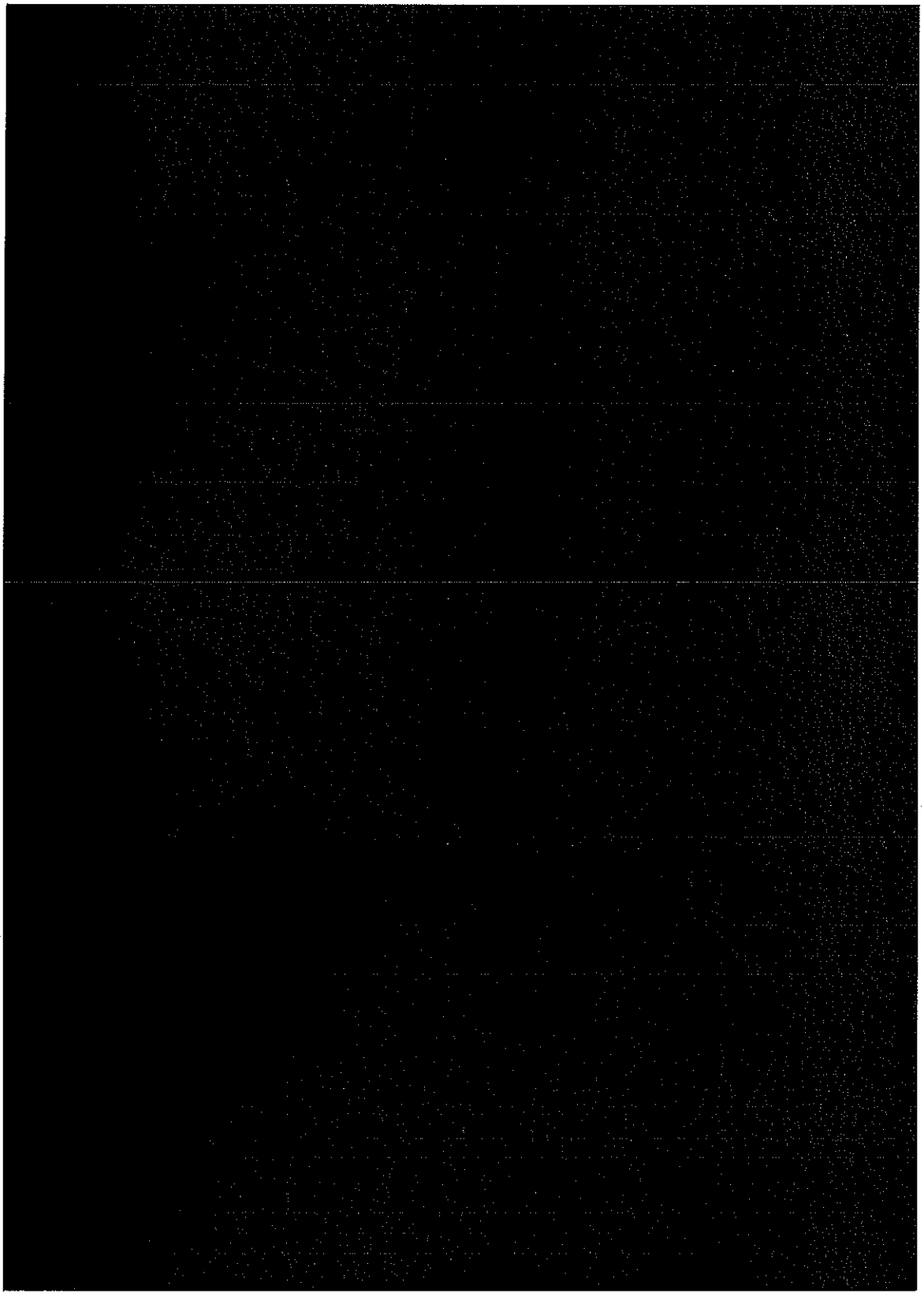
Section C

Part C 1.1.5Vehicle Design Area Breakdown Structure



Section C

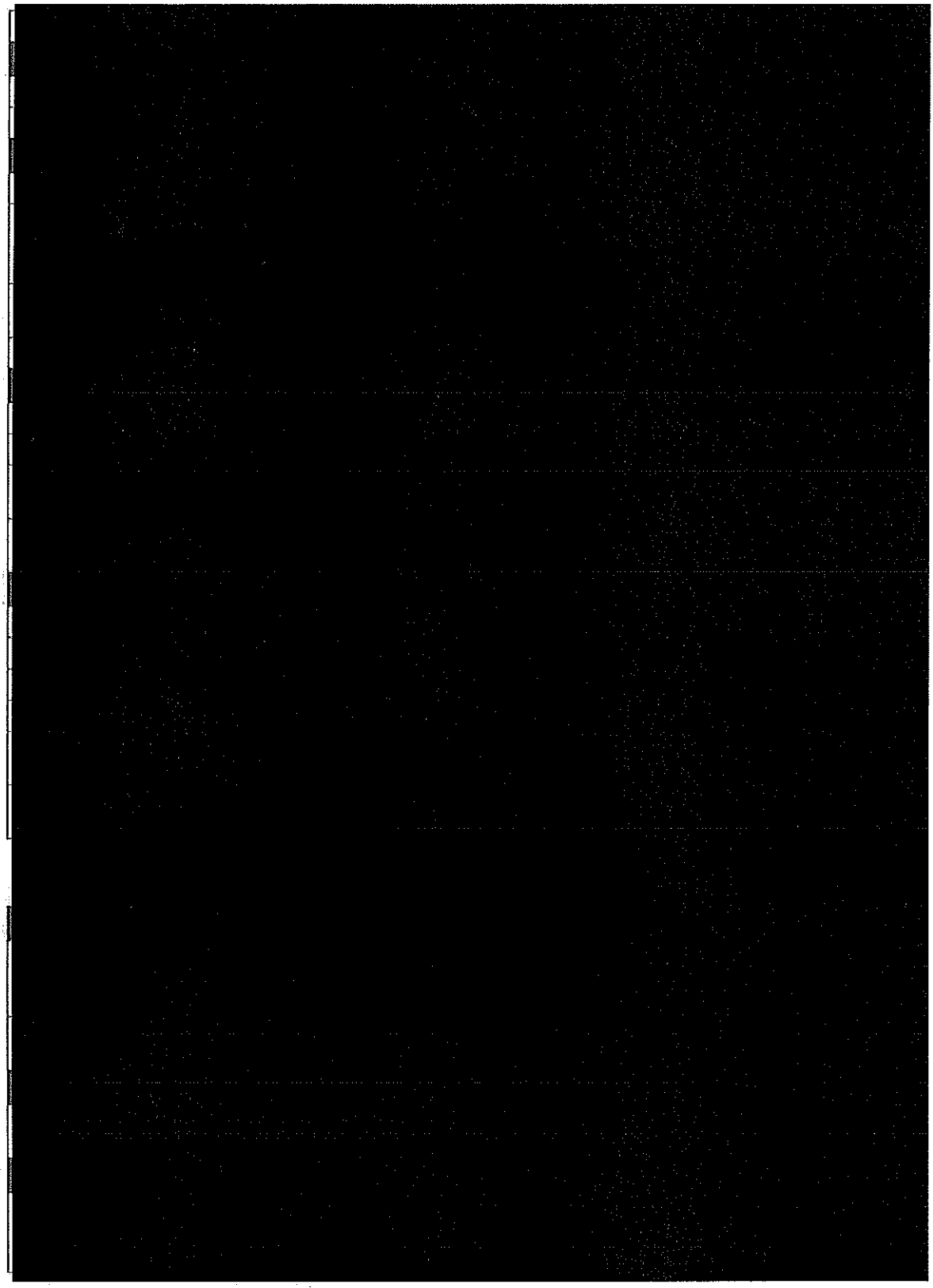
Part C 1.1.5Vehicle Design Area Breakdown Structure



Section C

New Rolling Stock for London Overground Project

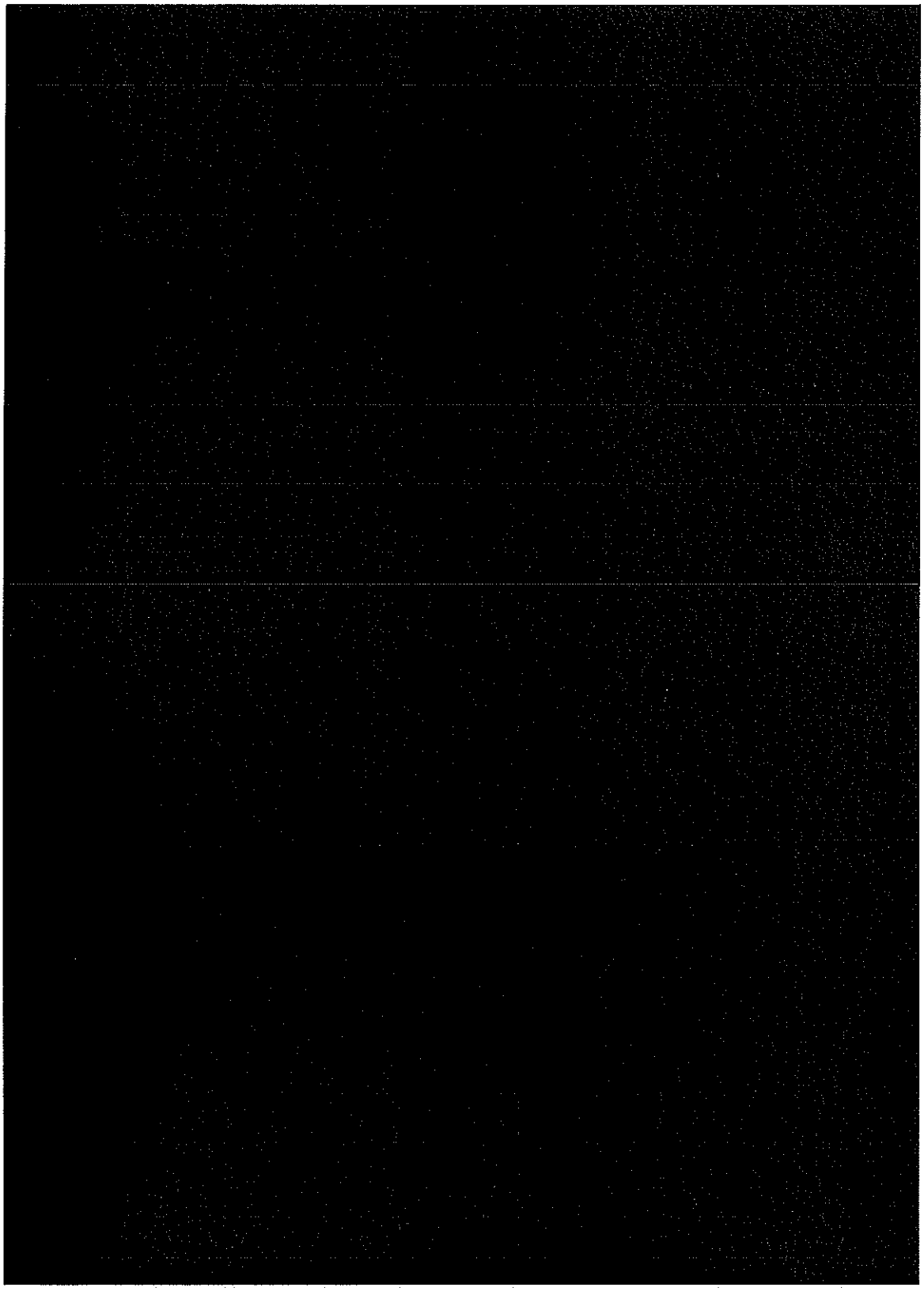
Part C 1.1.5Vehicle Design Area Breakdown Structure



D4

Section C

Part C 1.1.5Vehicle Design Area Breakdown Structure

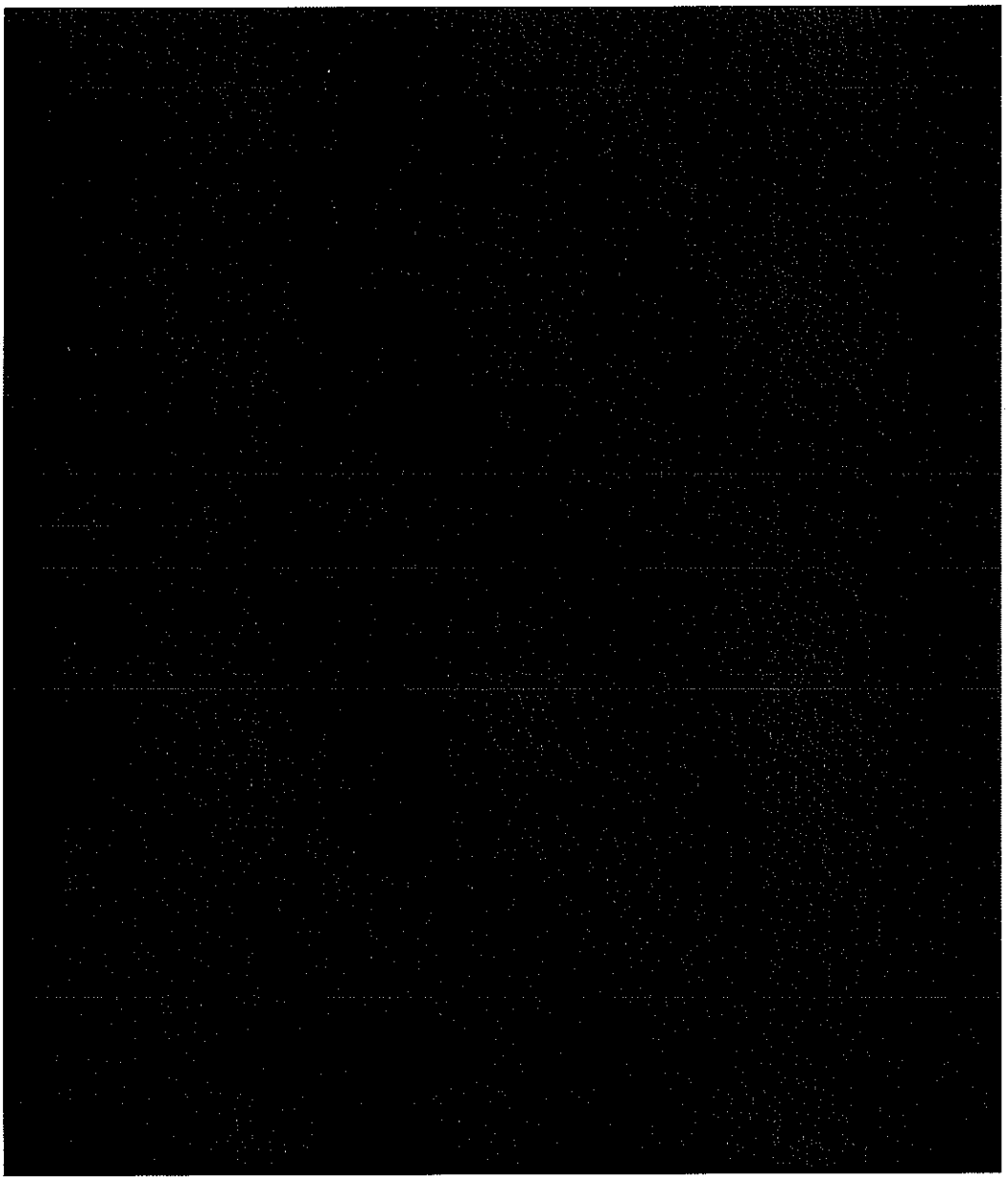


D5

D6

Section C

Part C 1.1.5Vehicle Design Area Breakdown Structure



REDACTED

Appendix 3
Hazard Management Procedure

A. Hazard Management

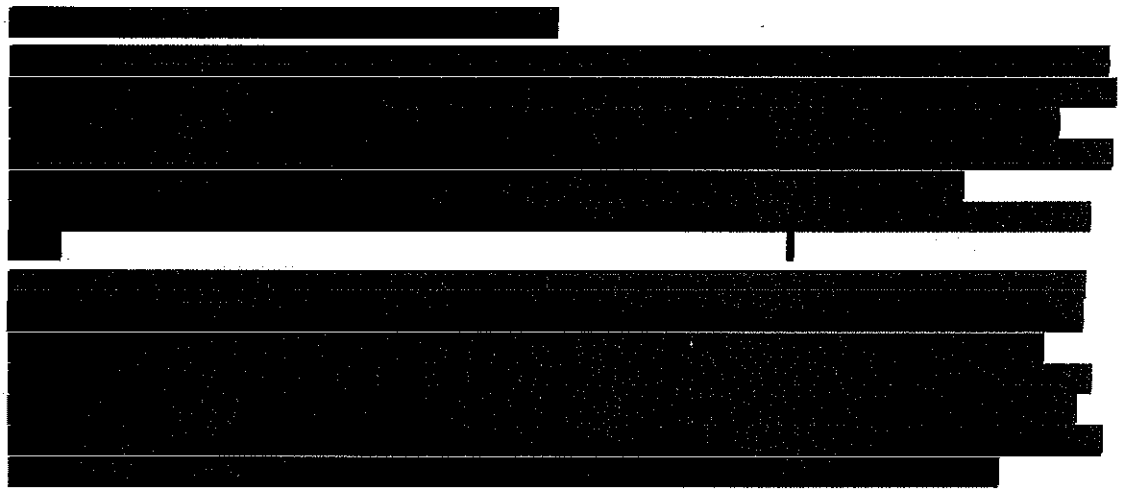
Hazards will be managed in compliance with this procedure.

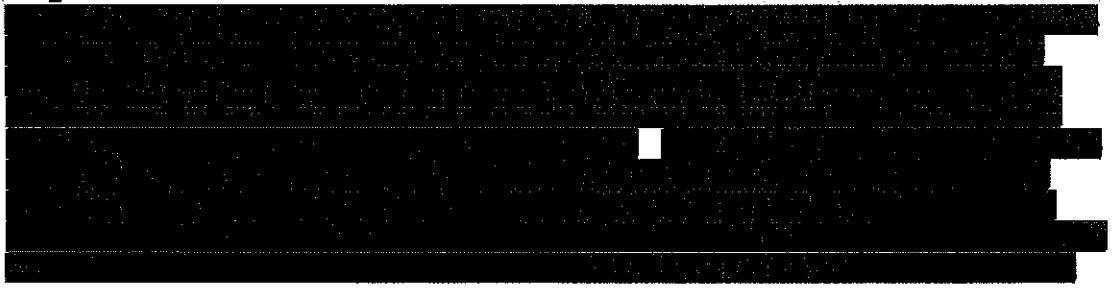
The Project Wide Hazard Record (PWHR) will be used as the management tool to record and track the hazards identified by the use of the techniques referred to in Sections **Error! Reference source not found.** to **Error! Reference source not found.** of [4] London Overground Unit RS System Safety Plan.

The PWHR is a "live" register of the hazards that have been identified and must be mitigated within the NRSLO Class 3XX Units Engineering Safety Reports that will support all stage tests as well as operations on the NRSLO infrastructure.

The Hazard Record identifies the proposed close out control measure needed to eliminate or reduce the severity and/or likelihood of the hazard to acceptable levels.

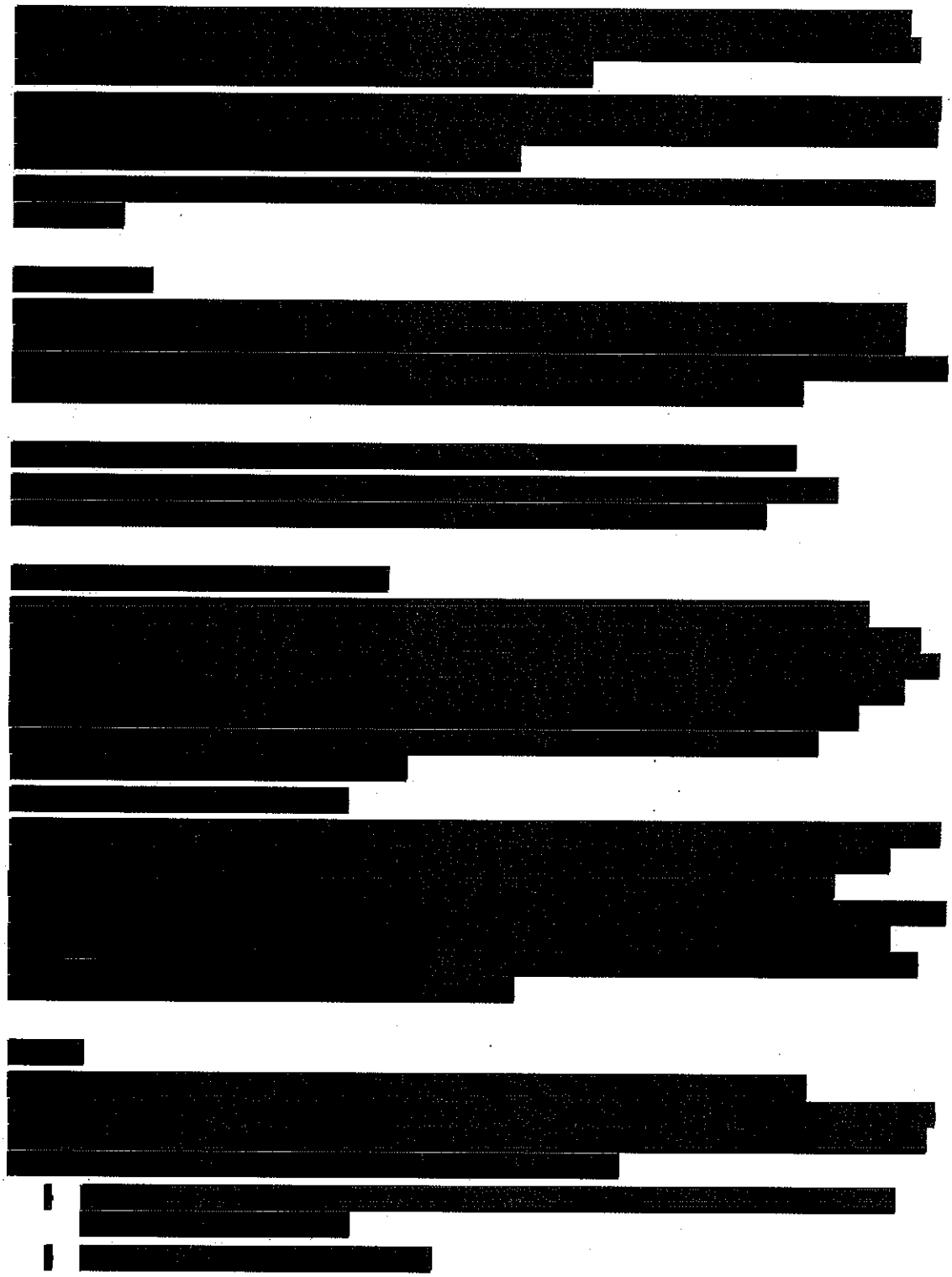
A1 [redacted]





[redacted]

TYPE 1



[redacted]

[redacted]

Schedule 6 – Appendix 3 – Hazard Management Procedure

Number	Title	Reference
[1]	Bombardier's Safety Management Procedure	3EER300001-4848 Revision _A
[2]	Common Safety Methods (CSMs):Commission Regulation (EC) No. 402/2013	
[3]	Class 3XX ISA memo	TBA
[4]	London Overground Unit RS System Safety Plan	3EER400018-6862

Appendix 4
System Safety Plan – Contents

Listed below are the proposed contents of the System Safety Plan (***System Safety Plan***) to be prepared by the Manufacturer. The Manufacturer may implement an alternative structure of headings provided that the requirements of the listed contents are addressed. Where appropriate, the Manufacturer may make reference to existing internal processes for engineering safety management and in such instances copies of such internal processes shall be provided with the System Safety Plan.

1. **Safety Policy and Strategy** – brief outline of the Manufacturer's own safety policy, strategy and arrangements for achieving engineering safety for the Works.

2. **Scope of the Plan** - what is covered, and what is not covered, by the System Safety Plan and with reference to the scope of the Works. Any constraints or assumptions relating to the scope of the System Safety Plan should be described.

   Explanation should be given of how the relationships between engineering safety, RAM, CSM Regulation, EMC/EMI, human factors, interoperability, testing and commissioning activities will be managed by the Manufacturer. Reference shall be made to the Manufacturer documentation, plans or strategies for managing these activities.

   The System Safety Plan shall include a system software safety plan prepared in accordance with BS EN 50128.

3. **Safety Requirements** – a description of how the system(s) safety requirements (including safety integrity levels (SILs), where appropriate) are to be derived from the Train Technical Specification, standards and other sources, and how and where compliance will be demonstrated.

   The Manufacturer is required to prepare a separate safety requirements specification (the ***Safety Requirements Specification***) at start of design for Assurance Acceptance by the Purchaser. Alternatively, the Manufacturer may choose, with prior agreement of the Purchaser, to identify safety requirements as part of the overall system requirements traceability strategy and not prepare a separate Safety Requirements Specification.

4. **Safety Analysis Methodology** – the tools and techniques to be applied during engineering safety assessment will depend on the complexity of the system(s), the perceived magnitude of the safety risks and whether the design is new/novel or bespoke. This section of the System Safety Plan shall describe those safety analysis processes the Manufacturer intends to implement with reference to recognised standards or internal procedures. This may include, but is not limited to:

   (a) hazard management

   (b) hazard identification (e.g. HAZOP, HAZID)

   (c) interface hazard analysis (e.g. IHA)

   (d) semi-quantitative risk assessment (e.g. Risk Matrix)

(e) quantitative risk assessment (e.g. FMECA, FTA, ETA)

(f) engineering safety auditing (internal and external)

5. **Safety Justification Strategy** – description of the proposed content of safety justifications supporting engineering safety assurance and approvals. To include:

(a) TC Component technical case(s) – in situations where it is necessary to seek pre-approval of new/novel or bespoke design equipment;

(b) Stage Gate engineering safety management reports; and

(c) system engineering safety justification(s) – design and final.

6. **Approval Process** – description of the internal verification, validation and approvals process for the engineering safety deliverables. Explanation shall be given regarding the requirement for, and proposed involvement of, any independent reviewers.

7. **Safety Approval of Modifications** – explanation of how engineering safety implications of design modifications and value engineering are to be assured and approved throughout the delivery of the Works (i.e. control of design changes).

8. **Operation and Maintenance Performance** – summary of the process for analysing operation and maintenance performance to ensure realised safety is compliant with service performance data and operational requirements.

It is expected that the Manufacturer will run appropriate HAZOPs or similar studies, involving the Purchaser, the Operator and others, to ensure operational and maintenance issues are adequately addressed.

9. **Control of Safety Interfaces** – identification of, and description of the process for, engineering safety management activities at internal and external interfaces, in particular those interfaces relating to systems integration requirements arising from the operation of Units on the LO Infrastructure.

The Manufacturer will prepare an IHA to confirm the engineering safety implications at internal and external interfaces have been adequately addressed and managed. The IHA will involve the Purchaser and all relevant interfacing contractors and third Parties.

The IHA will take cognisance of the systems engineering requirements related to the integration of the Units with other systems on the LO Infrastructure.

10. **Subcontractor Safety Management** – explanation of how the engineering safety management arrangements of Subcontractors and suppliers will be managed to be compatible with the System Safety Plan.

REDACTED

Appendix 5
Bid Reliability Growth Commitment

Section C

Part C 1.1.23 Fleet Reliability Growth Commitment

A. Introduction

Bombardier's proposal for New Rolling Stock for London Overground will deliver high level Reliability Performance with a design that comfortably achieves the customer's requirements laid down in the MSA, i.e. the unit design requirement of 50,000 miles between 3 minutes or more service affecting failures and the fleet acceptance criteria of 48,000 miles MDBSAF (80% of Bombardier's commitment of 60,000 miles MDBSAF). The foundation for this achievement is based upon the careful selection of existing sub-system designs that are proven in service. Bombardier's extensive operational data relating to its numerous fleets of trains successfully operating in the UK underpins this selection.

The following sections formally declare our reliability growth commitment in line with requirements stated within the customer's Proposal Template.

Features	Benefits
The New Rolling Stock for London Overground Unit design follows the Aventra/Crossrail Unit design very closely. This design minimises the likelihood of faults which may result in a major incident (resulting in a delay of 30 minutes or more in the 'Liverpool Street Approach' section, or 60 minutes or more on normal infrastructure).	Robust reliability and availability which protects the integrity of the train from the first Unit going into service. In addition, any design improvements found and instigated on the Crossrail Unit will correspondingly be applied to the New Rolling Stock for London Overground AVENTRA Unit. Customer satisfaction.
Careful selection of existing sub-system designs proven in service by extensive operational data from Bombardier's numerous fleets of trains successfully operating in the UK. This will allow the achievement of reliability levels in excess of 60,000 miles MDBSAF.	High level reliability performance.

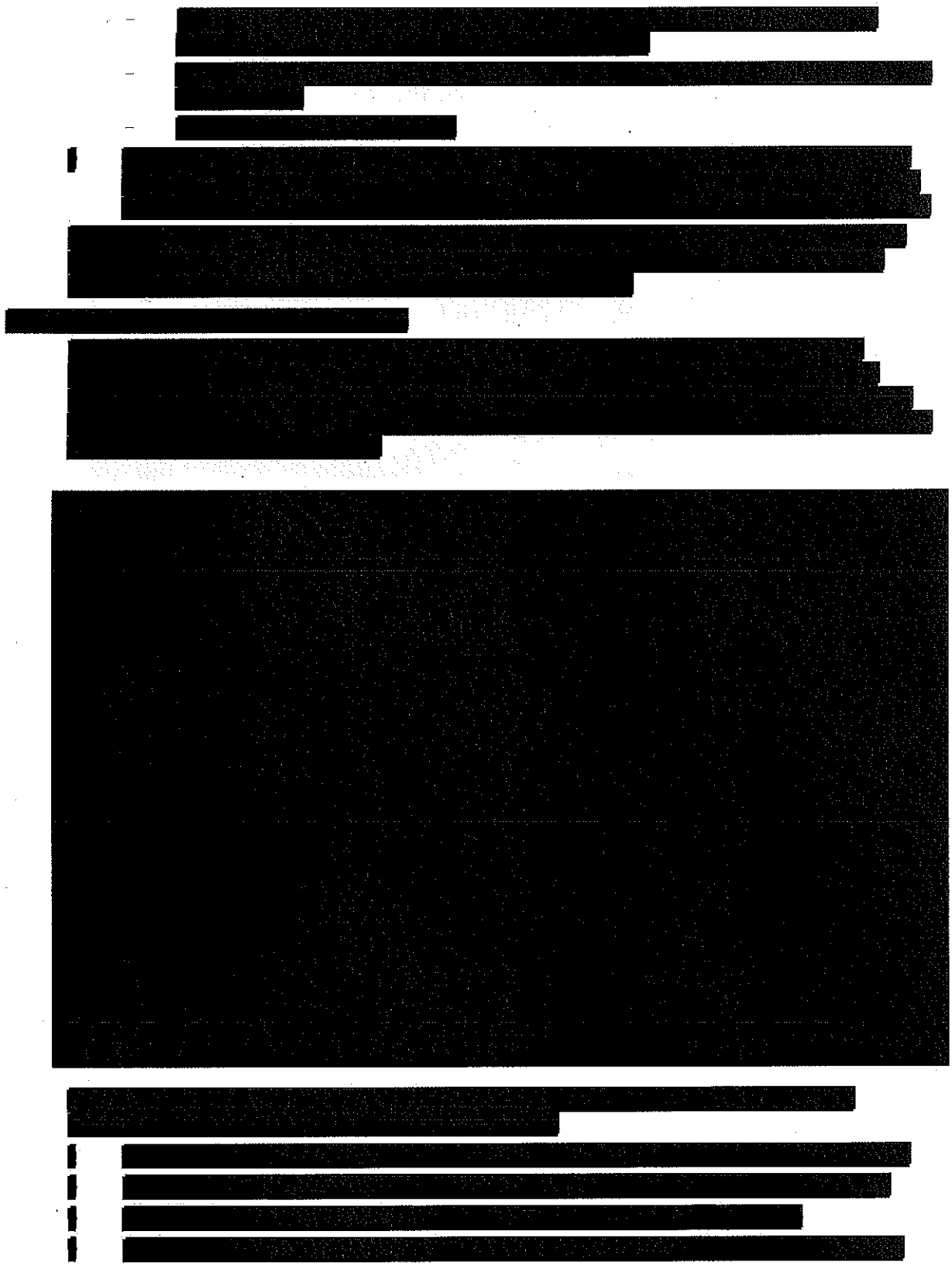
This is the Bombardier proposal that contains the information necessary to address this section of the customer proposal template as set out in Part C Deliverability Submission, Paragraph 1.23 Fleet Reliability Growth Commitment.

B. Technical Description

[redacted]

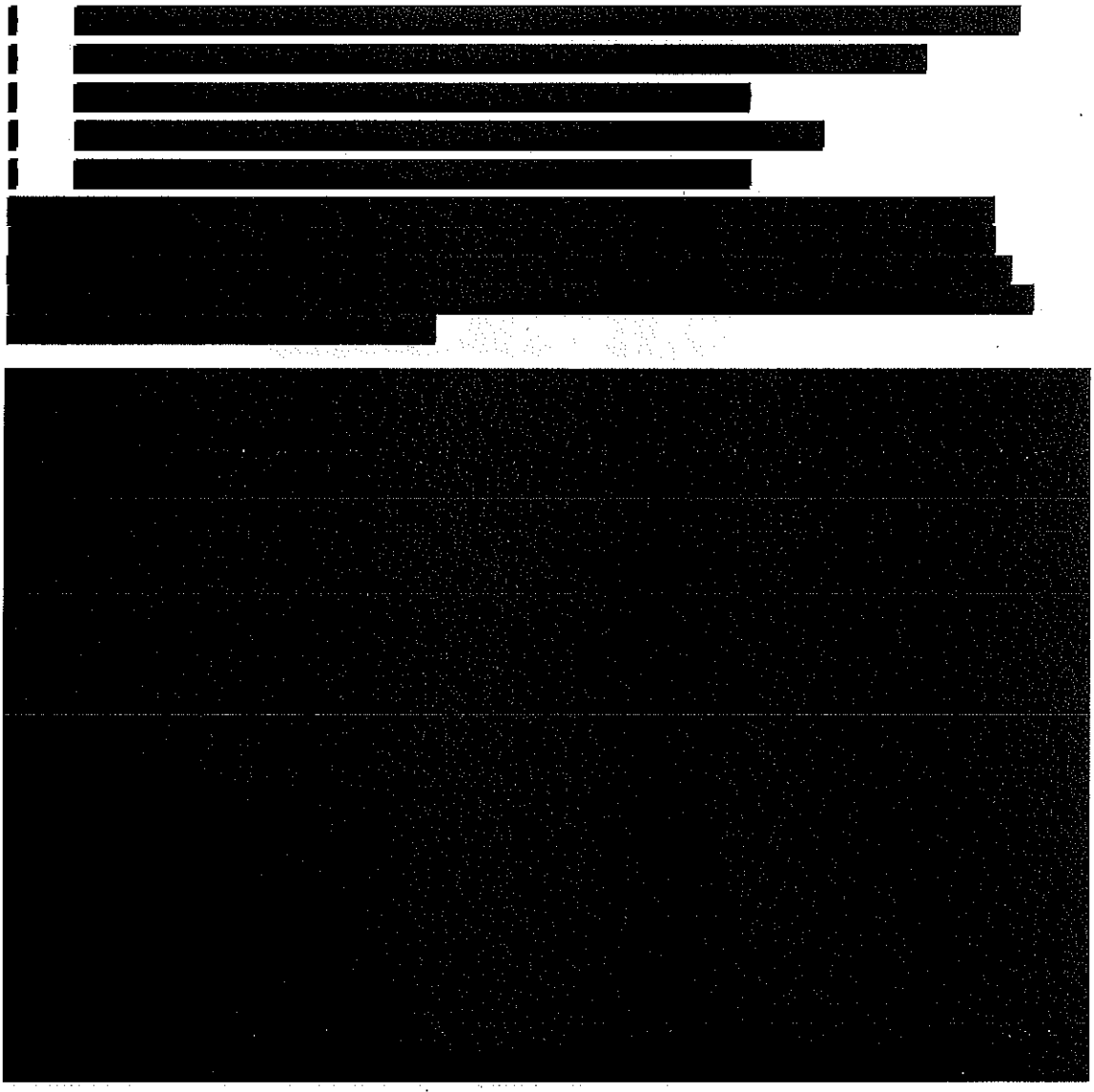
Section C

Part C 1.1.23 Fleet Reliability Growth Commitment



Section C

Part C 1.1.23 Fleet Reliability Growth Commitment



C. Glossary of Terms

DPI	Delay Per Incident
MDBF	Mean Distance Between Failure
MDBSAF	Mean Distance Between Service Affecting Failure
MSA	Manufacture and Supply Agreement
SAF	Service Affecting Failure

Section C

Part C 1.1.23 Fleet Reliability Growth Commitment

D. Supporting Information

No supporting information included.

Title	File Name
No supporting information attached	

Appendix 6
Table of Assurance Acceptance submissions

Part of Agreement	Clause Reference	Subject Matter
Agreement	6.5	Manuals
Agreement	8.3(b)	Amendment to the Project Programme
Agreement	8.7(b); 10.6(f)(i)(B)	Amendment to Manufacturer Train Proposal
Agreement	8.8(b)	Amendment to Plans
Agreement	13.2	Maintenance plan
Schedule 6 (*Assurance Acceptance*)	Paragraph 3.1(b)	TAP
Schedule 6 (*Assurance Acceptance*)	Paragraph 3.1(d)	Amendment to TAP
Schedule 6 (*Assurance Acceptance*)	Paragraph 5.2(a)	Interfaces
Schedule 6 (*Assurance Acceptance*)	Paragraph 4.4(a)	Technical Case
Schedule 6 (*Assurance Acceptance*)	Paragraph 8.2(a)	Reliability Growth Plan
Schedule 6 (*Assurance Acceptance*)	Paragraph 8.2(g)	RAM Management Plan
Schedule 6 (*Assurance Acceptance*)	Paragraph 8.2(h)	Amendment to RAM Management Plan
Schedule 6 (*Assurance Acceptance*)	Paragraph 11.2	Unit Design Management Plan
Schedule 6 (*Assurance Acceptance*)	Paragraph 11.6(a)	Preliminary Unit Design Submissions
Schedule 6 (*Assurance Acceptance*)	Paragraph 11.7(a)	Detailed Unit Design Submissions
Schedule 6 (*Assurance Acceptance*)	Appendix 4 (*System Safety Plan – Contents*), paragraph 3	Safety Requirements Specification

Schedule 7 (*Testing*)	Paragraph 1.2	Testing strategy
Schedule 7 (*Testing*)	Paragraph 1.4	Schedule of tests
Schedule 7 (*Testing*)	Paragraph 1.4	Testing programme
Schedule 7 (*Testing*)	Paragraph 1.10	Test specification
Schedule 9 (*Maintenance Facilities and Chingford Stabling Site*)	Paragraph 1.1	Fit Out Specification
Schedule 9 (*Maintenance Facilities and Chingford Stabling Site*)	Paragraph 1.2	Manufacturer Fit Out Works
Schedule 9 (*Maintenance Facilities and Chingford Stabling Site*)	Paragraph 1.2	Method Statement
Schedule 14 (*Responsible Procurement*)	Paragraph 2.2(a)	Responsible Procurement Plan
Schedule 14 (*Responsible Procurement*)	Paragraph 2.2(d)	Revised Responsible Procurement Plan
Schedule 14 (*Responsible Procurement*)	Paragraph 3.2(a)	Revised Strategic Labour Needs and Training Plan

Schedule 7
Testing

Part A	**Testing Requirements**
Part B	**Testing Strategy**
Part C	**Schedule of Tests**
Part D	**Testing Programme**

Part A Testing Requirements

1. Agreed Testing Strategy, Agreed Schedule of Tests and Agreed Testing Programme

1.1 The Manufacturer shall perform tests on the Units and Equipment in accordance with Applicable Laws and Standards including BS EN 50215 (1999) – "Railway applications. Testing of rolling stock after completion of construction and before entry into service" in order to demonstrate (to the satisfaction of the Purchaser) that the Units and Equipment have been built in accordance with every part of the Train Technical Requirements, the obligations of this Agreement and all Applicable Laws and Standards.

1.2 Within three months of the Commencement Date, the Manufacturer shall provide to the Purchaser for Assurance Acceptance an updated version of the provisional testing strategy (in the form described in Part B (*Testing Strategy*) of this Schedule 7), setting out how it shall satisfy the requirements of paragraph 1.1 of this Part A.

1.3 No later than six months prior to the date on which the first test is scheduled to be carried out, the Manufacturer shall provide to the Purchaser for Assurance Acceptance its schedule of tests and testing programme (in the form in Part C (*Schedule of Tests*) and Part D (*Testing Programme*) respectively of this Schedule 7), setting out the proposed dates for satisfying the requirements of paragraph 1.1 of this Part A.

1.4 In the course of its review of the draft testing strategy, draft schedule of tests and draft testing programme for Assurance Acceptance, the Purchaser may specify any additional tests which it requires in order to be assured that the Vehicle and/or Unit and/or item of Equipment (as the case may be) has satisfied any of the requirements specified in this Agreement. Upon Assurance Acceptance of such draft strategy, draft schedule and draft programme, they shall be the ***Agreed Testing Strategy***, the ***Agreed Schedule of Tests*** and the ***Agreed Testing Programme*** respectively for the purposes of this Agreement.

1.5 The Agreed Testing Strategy, the Agreed Schedule of Tests and the Agreed Testing Programme shall together describe and set out the nature of the tests, specifications, methodology, pass/fail criteria, test location and date for each test against the corresponding part of the Train Specification and shall comprise the following parts:

(a) Type Tests (in accordance with paragraph 2);

(b) Factory Acceptance Tests (in accordance with paragraph 3);

(c) Testing on the LO Infrastructure (in accordance with paragraph 4);

(d) Equipment Acceptance Tests (in accordance with paragraph 5).

1.6 The Manufacturer shall identify in the Agreed Testing Strategy those tests which, if the Purchaser exercises an Option to acquire Option Vehicles, will need to be carried out again in relation to the Option Vehicles and in relation to the functionality of the Extended Units as a completed Unit.

1.7 The Manufacturer shall identify in the Agreed Testing Strategy those tests to be carried out on the Dual Voltage Units and the AC Only Units.

1.8 The Manufacturer shall set out in the Agreed Testing Strategy how it proposes to retest those Units that incur Modifications that arise during the manufacturing process. The Manufacturer shall make all necessary allowance in the Agreed Testing Programme for the said retesting.

1.9 Where the Manufacturer does not submit a full test specification to the Purchaser in respect of each test described under paragraphs 1.5, 1.6 and 1.7, it shall indicate a date in the Agreed Testing Programme when such test specification shall be provided to the Purchaser for Assurance Acceptance (which shall be no later than three months before such test is scheduled to be carried out).

1.10 If the Manufacturer wishes to change any tests in the Agreed Schedule of Tests or Agreed Testing Programme, it shall submit to the Purchaser for Assurance Acceptance the proposed test specification with clearly defined pass/fail criteria at least two months before such test is scheduled to be carried out.

2. Type Tests

2.1 In the Agreed Testing Strategy, the Agreed Schedule of Tests and the Agreed Testing Programme, the Manufacturer shall:

(a) describe those Type Tests or other tests that it will conduct on the Units (such as ride quality and emergency brake testing) and those Type Tests that will be conducted in relation to a particular Subsystem (such as body shell strength); and

(b) identify any Type Tests that it will undertake in relation to the Units on the LO Infrastructure; and

(c) ensure that the Agreed Testing Programme clearly identifies which Type Tests are to be undertaken only in relation to a AC Only Unit and which Type Tests are to be undertaken only in relation to a Dual Voltage Unit and which Type Tests are to be undertaken in relation to both AC Only Units and Dual Voltage Units.

2.2 The Manufacturer shall conduct each of the Type Tests on each component, Subsystem, system, Vehicle and Unit in accordance with the Agreed Schedule of Tests and the Agreed Testing Programme provided that the Manufacturer may submit previous type test results if it is able to demonstrate to the satisfaction of the Purchaser that such type test results (and the type test itself) satisfy the requirements for the components, Subsystems, systems, Vehicles and Units set out in this Agreement.

3. Factory Acceptance Tests

3.1 In the Agreed Schedule of Tests, the Manufacturer shall describe the routine tests to be undertaken by the Manufacturer during manufacture of the Units to confirm quality, functionality and safety of each of the Units (the ***Factory Acceptance Tests***).

3.2 The Factory Acceptance Tests shall be performed at the Manufacturer's Works to demonstrate functionality of the Units, Vehicles and all Subsystems prior to Pre-Provisional Acceptance.

3.3 The Manufacturer shall perform the Factory Acceptance Tests on individual Vehicles as well as on configured Units as appropriate to the particular test. Where the Vehicles are configured into a Unit for the undertaking of the Factory Acceptance Tests, such configuration shall be the configuration to be delivered and offered to the Purchaser for Acceptance and any revalidation of such Factory Acceptance Tests shall be carried out prior to delivery at the Designated Delivery Location (but without any disassembly or re-assembly of such Unit). Any deviation from these requirements shall be agreed between the Parties prior to testing of the relevant Unit.

3.4 The Purchaser reserves the right to specify (at any time) any additional Factory Acceptance Tests where the Purchaser reasonably considers further evidence is required to demonstrate that a Unit has satisfied any of the requirements specified in this Agreement and the Manufacturer agrees to carry out any such additional Factory Acceptance Tests.

4. Testing on the LO Infrastructure

4.1 In the Agreed Testing Strategy, the Agreed Schedule of Tests and the Agreed Testing Programme, the Manufacturer shall set out the nature and form of any Type Tests to be undertaken on the LO Infrastructure in order for the Units to demonstrate compatibility and performance running on the LO Infrastructure and shall produce a specification describing, in respect of each proposed test, the test procedure and pass/fail criteria and a programme showing the proposed timeframes for conducting such tests (***Network Testing Programme***).

4.2 The Manufacturer shall set out those on LO Infrastructure tests required to provide assurance in respect of individual Units (including post-delivery/re-assembly checks and mileage accumulation) and schedule and execute the tests to comply with the Project Programme.

4.3 Pursuant to clause 14.3(c), the Purchaser or its representatives shall be entitled to witness any test of the Units conducted on the LO Infrastructure and the Manufacturer shall provide reasonable prior written notice to the Purchaser of the testing being undertaken. The Manufacturer shall conduct each of the tests described in the Network Testing Programme in respect of the Units and shall promptly and in any event no later than ten Working Days following the conduct of a test in respect of a Unit on the LO Infrastructure provide the Purchaser with a summary of the results of that test and whether the Unit passed or failed the test.

4.4 Where the Manufacturer is unable to comply with paragraph 4.2 as a result of any area of the LO Infrastructure being Unavailable Infrastructure, the on LO Infrastructure tests in respect of that area of the LO Infrastructure shall be postponed until such time as that area of the LO Infrastructure becomes Available Infrastructure and the provisions of clause 15.2(b) shall apply.

4.5 The Manufacturer acknowledges and agrees that;

(a) it is responsible for agreeing the Network Testing Programme with Network Rail and all subsequent testing of the Units on the LO Infrastructure, including:

(i) securing the paths and access rights for carrying out testing on the LO Infrastructure;

(ii) the provision of persons necessary to conduct and supervise a test (including drivers) and to perform all of the activities described in this paragraph 4.5(a);

(iii) the provision of any equipment, Spares and Special Tools necessary to conduct and/or monitor the tests to be performed by the Manufacturer and to undertake the activities under this paragraph 4.5(a);

(iv) the maintenance of the Units prior to and after the conduct of a test and the repair and/or rectification of any defects, faults and/or damage;

(v) the security of the Units when such Units are under the supervision and/or control of the Manufacturer;

(vi) obtaining any Relevant Approvals required in accordance with any Applicable Laws and Standards; and

(vii) the provision of suitable stabling for the relevant Units and the necessary paths to and from the testing location; and

(b) save as where otherwise provided under this Agreement, any delay howsoever caused or arising in agreeing the Network Testing Programme with Network Rail, obtaining a test path, conducting a test in accordance with the Network Testing Programme and/or any other event contemplated by this paragraph 4 shall not:

(i) constitute a Change under the Change Procedure; or

(ii) entitle the Manufacturer to an extension of time to the Contractual Acceptance Date for any Unit or item of Equipment or otherwise entitle the Manufacturer to any relief from any of its obligations under this Agreement including any adjustment to the Project Programme; or

(iii) in any way entitle the Manufacturer to be reimbursed for any costs and expenses incurred or otherwise compensated in any form or manner.

5. Equipment Acceptance Tests

5.1 The Agreed Schedule of Tests shall set out detailed specifications of the Equipment Acceptance Tests to be carried out on the Simulator and each Spare and Special Tool.

5.2 Pursuant to clause 14.3(c), the Purchaser or its representatives shall be entitled to witness any Equipment Acceptance Test and the Manufacturer shall provide reasonable prior written notice to the Purchaser of when such testing shall be undertaken. The Manufacturer shall conduct each of the Equipment Acceptance Tests described in the Agreed Testing Strategy and Agreed Schedule of Tests in accordance with the Agreed Testing Programme and shall promptly and in any event no later than ten Working Days following the conduct of such Equipment Acceptance Test(s) provide the Purchaser with a summary of the results and whether each item of Equipment passed or failed such test(s).

6. Disputes

Without prejudice to the requirement to comply with Assurance Acceptance procedures, if the Parties do not agree any matter referred to in this Schedule 7, then either Party may refer the matter as an Expert Dispute for resolution under the Dispute Resolution Procedure.

REDACTED

Part B Testing Strategy

Section C

Part C 1.1.16 Testing Strategy

A. Introduction

Bombardier's proposed testing strategy for the New Rolling Stock for London Overground (NRSLO) project builds on our experience and lessons learned from the testing of recent projects such as Class 379 (LERL), Class 378 (NLR/ELR), S-Stock (LU) and 09 Tube Stock (LU). This approach will:

1. Provide proof that the Bombardier unit design meets the technical specification and applicable standards – achieved through our type tests
2. Provide proof that the Bombardier unit is safe for employees and passengers to use – achieved through our type tests
3. Provide proof that the Bombardier unit is compatible with the infrastructure (including the interfacing off-train systems such as the signalling systems and DOO on the new and existing London Overground routes and that of the neighbouring railways – achieved through our type tests and infrastructure compatibility tests
4. Provide assurance that our units are being built to specification and that a consistent product is being delivered – achieved through our factory acceptance (routine) tests
5. As the units are introduced, minimise the impact to the existing services operating on the London Overground infrastructure – achieved through our commissioning activities
6. Improve the reliability of units entering service – achieved through a vigorous testing approach that will identify problems early, enabling their timely resolution
7. Mitigate the risk to the overall delivery programme – achieved through the overall approach adopted in this test strategy and the provision of appropriate facilities

This strategy is consistent with the Technical Assurance Plan that describes the overall process for ensuring that the built units will meet the technical specifications. A unit test schedule and a unit test programme have been developed in accordance with this strategy and incorporated into the project programme and the train works programme (master project schedule).

Features	Benefits
Bombardier demonstrates extensive experience from the testing of recent projects such as Class 379 (LERL), Class 378 (NLR/ELR), S-Stock (LU) and 09 Tube Stock (LU)	Significantly minimises the risk to delivery of the project
A highly skilled, experienced, well-staffed resource pool qualified to deliver	Bombardier can easily meet staffing requirements for the testing period
Bombardier is in a unique position of having introduced many new fleets of trains to the London area in recent years and has developed a comprehensive understanding of the compatibility issues and where specific tests are really required	Positive impact on the RfL schedule whilst ensuring that compatibility is demonstrated
[redacted]	[redacted]

Section C

Part C 1.1.16 Testing Strategy

We have used our extensive experience of recent test programmes to ensure the deliverability of this testing strategy. The strategy uses [redacted] to complete the programme of testing to support acceptance and approval. [redacted] This approach of [redacted] type testing was successfully implemented on the recent Class 379 project for LERL Stansted Express. Bombardier will produce a detailed test programme for all test trains, managed by a dedicated Test Manager and implemented by the engineering team with support from Bombardier's experienced Product Introduction team.

[redacted]

A1 Definitions

Term/Abbreviation	Definition
Approvals Plan	The document describing the approach for achieving authorisation for the units (as required by section 9 of Schedule 5 of the MSA and submitted as Part C.1.18).
Approvals	See authorisation
(Technical) Assurance Plan	The document describing the approach and processes to provide progressive assurance that the units will meet the technical requirements through the technical cases as required by MSA Schedule 5. A preliminary version of this document has been submitted as Part C.1.8 of the bid proposal.
Authorisation	The process whereby rolling stock is permitted to enter passenger service by the ORR as defined in the Interoperability Regulations (R(I)R).
Assurance	A risk based approach for progressively demonstrating that the units meet the technical requirements
Acceptance	The process by which RfL will take ownership of the units, which is dependent on the assurance provided, obtaining the necessary authorisation and demonstrating that units have been built to the necessary quality standard.
BRB	BRB (Residuary) Ltd, the state owned company responsible for the remaining functions of the British Rail Board post privatisation.

Section C

Part C 1.1.16 Testing Strategy

Term/Abbreviation	Definition
Compatibility File	The documents that demonstrate the conditions under which rolling stock and infrastructure compatibility has been assessed, as defined in GE/RT8270.
[redacted]	The Bombardier term for the test schedule as contained in the Bombardier submission for Part C.1.17 as required in MSA Schedule 7 (Testing) – Part C).
[redacted]	The Bombardier term for the (vehicle) test programme as contained in the Bombardier submission for Part C.1.17 as required in MSA Schedule 7 (Testing) – Part C).
DOORS	The proprietary requirements management database used by Bombardier.
LU	London Underground
(the) Network	The infrastructure and other railway subsystems that the units will operate over or near to, including Network Rail infrastructure and any neighbouring railways.
QMS	Quality management system
(Preliminary Train Works) Quality Management Plan	The document(s) describing Bombardier's Quality Management System. A preliminary version has been submitted as part of Bombardier's bid Part C.3.4.1
RGS	Railway Group Standard
RfL	Rail for London
R(I)R	The Railways (Interoperability) Regulations 2006 (and amendments)
Requirements	The requirements captured in the DOORS database where an assessment of conformance is required.
Routine Test(s)	The tests and inspections undertaken on every Unit to ensure the conformity of the built vehicles. This term is widely used in Bombardier and has the same meaning as factory acceptance tests as described in the MSA/TSA
RSSB	Railway Safety and Standards Board
Schedule and Programme of Depot Tests	The tests to demonstrate that the depot facilities are suitable for carrying out the unit maintenance activities as required by RSPA Part 3 of Schedule C7 and described in Section E Part 1.17 of the Bombardier bid submission.
Statement of Compatibility	Written notification by an infrastructure manager or a railway undertaking of compatibility between the rolling stock and infrastructure as defined in GE/RT8270
TCMS	Train Control & Monitoring System, which has the same meaning as TMS (Train Management System) as defined in the technical specification
TEN	Trans-European Network
Technical Specification	The NRSLO unit design requirements as contained in MMD-RS-TS-00004
(Rolling Stock)Technical Case	The documentation that provides the assurance evidence that the RfL requirements in the technical specification
TSI	Technical Specification for Interoperability
The unit(s)	The new London Overground unit(s)

Section C

Part C 1.1.16 Testing Strategy

Term/Abbreviation	Definition
Validation activity	An activity that will demonstrate that one or more requirements have been achieved by the unit Note: within this document this term may be used to describe both validation and verification activities unless a distinction is required.
Validation Plan	A document containing the activities required to provide the evidence that the requirements will or have been met
Vehicle Architecture	The Bombardier name for the vehicle design area breakdown structure (MSA Schedule 6 (Assurance Acceptance) – Appendix 2) that has been submitted as Part C.1.5.
(Vehicle) Test Schedule (Plan)	The list of (type) tests to be carried out on the units to demonstrate compliance with the requirements as required by Schedule 7 (Testing) – Part C of the MSA. An initial version has been submitted as part of the bid submission in response to Part C.1.17 of the proposal template. This is sometimes referred to as a Doc 25 within Bombardier
(Vehicle) Test Programme	The programme for carrying out the test schedule as required by Schedule 7 (Testing) – Part C of the MSA. An initial version has been submitted as part of the bid submission in response to Part C.1.17 of the proposal template. This is sometimes referred to as a Doc 26 within Bombardier
Verification activity	An activity to ensure that the Unit design will meet one or more requirements (i.e. a development or risk reduction activity).
All other definitions are as per MSA Section 1, Interpretation.	

B. Engineering Testing (type tests and compatibility)

B1 [redacted]

Schedule 8
Spares and Special Tools

Part A	**Initial Spares**
Part B	**Initial Special Tools**

REDACTED

Part A Initial Spares

Introduction

1. Standard Services Initial Spares

2. Additional Services Initial Spares

Schedule 8 Part A

Spares

Table of Contents

1 Introduction

Bombardier provides the following Initial Spares Lists, in response to the requirements of Schedule 8 Part A.

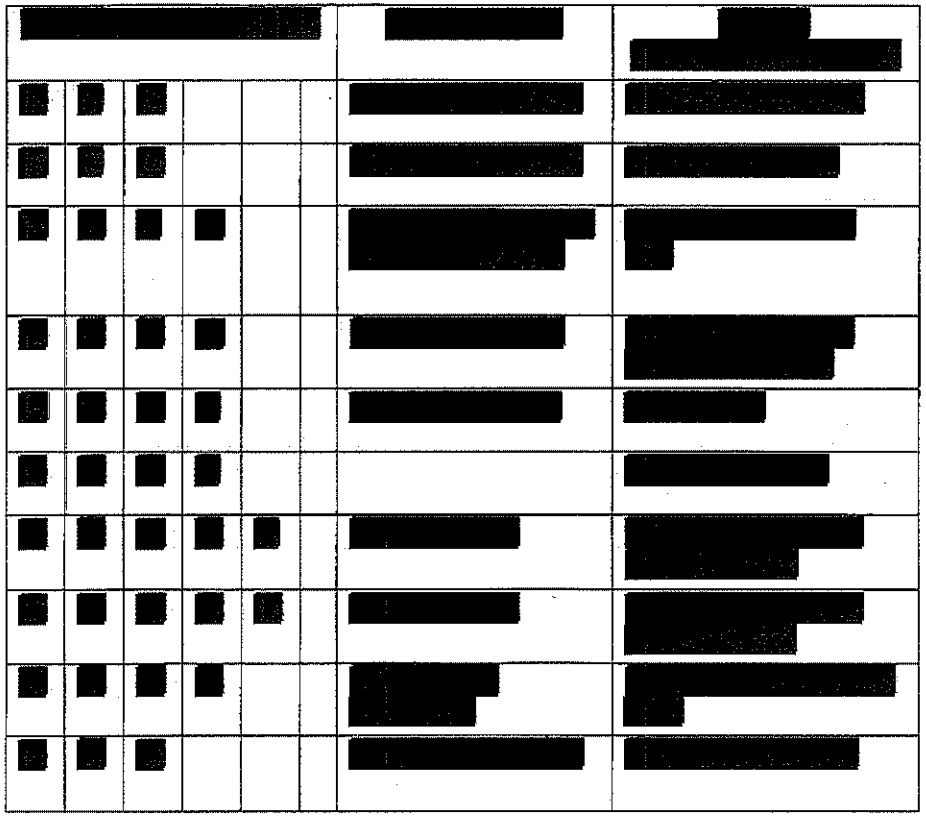
The Spares Lists are prepared based on the operational experience of Bombardier managing over 20 fleet introductions with operators of MOVIA ™, ELECTROSTAR™ and TURBOSTAR™ vehicles.

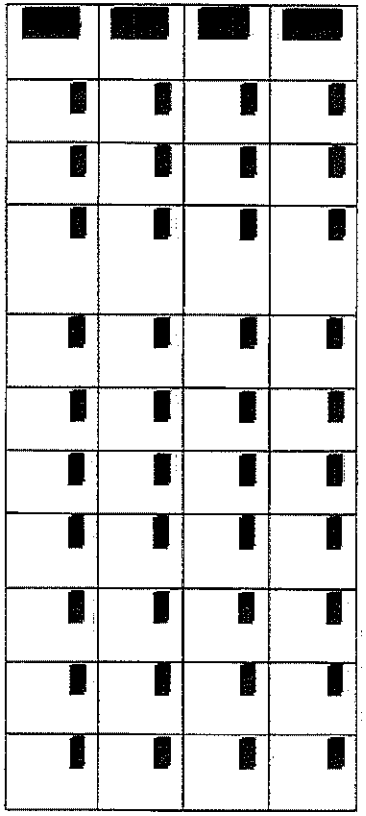
The list is typical of the Standard Services Initial Spares that would be provided as part of service introduction and is an example of the depth of the Standard Services Initial Spares that will be provided.
The Spares Lists should be reviewed with reference to the following points:

- Final subcontractor selection
- Design freeze
- Definition of the Maintenance Regime

The delivery of the Initial Spares will be in accordance with the Relevant Acceptance Date.

2 Standard Services Initial Spares





Base Vehicles	Insertion Vehicles	Additional Units
Spares Quantity	Spares Quantity	Spares Quantity
2	-	-
2	-	-
4	-	-
4	-	-
4	-	-
4	-	-
8	-	-
8	-	-
5	-	-
4	-	-