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WORKS INFORMATION

Volume 2B – General Requirements

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Part 1 – Not Used

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Part 2 – Not Used

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Part 3 – Planning, Environmental and Traffic Consents

3.1 Introduction

For the purposes of this part of the Works Information Consents means all town planning, environmental and traffic permissions, approvals, permits, licences, or authorisations required from a Consent granting body in order to undertake and complete the *works*.

The Crossrail Act 2008, among other things:

- grants deemed planning permission for the proposed works, subject to the conditions imposed by Section 10 and Schedule 7 of the Crossrail Act 2008, which requires plans and specifications for permanent works and construction arrangements for all works to be approved by relevant local authorities;
- sets out requirements for obtaining Consent for specific details of the proposals which will be submitted to the Consent granting body before the relevant works commence where these regimes are different to those under normal legislation;
- disappplies some Consents that are normally required by law, such disapplications apply only for works that are permitted under the Crossrail Act 2008 and the *Contractor* shall be aware that there is generally an alternative regime in place under the Crossrail Act 2008; and
- powers apply only within the Limits of Deviation, the limits of land to be acquired or used and for some specific works listed in the various Schedules of the Crossrail Act 2008, elsewhere normal legislation applies.

3.2 Employer's Planning, Environment and Traffic Consents

The *Contractor* shall prepare and compile the applications for *Employer's* Consents specified in the tables in Appendices 3A, 3B and 3C that are applicable to the *works* unless:

- they have been prepared and compiled by the *Employer*,
- they have been submitted to the Consent granting bodies by the *Employer*, or
- Consent has been received from the Consent granting bodies

The current status of all *Employer's* Consent applications in progress, submitted or granted for the *works* is included in the Works Information. The *Project Manager* will provide the *Contractor* with copies of all relevant *Employer's* planning, environment and traffic Consents registers, Consent applications, decision notices and correspondence. Thereafter the *Contractor* maintains these registers and records of correspondence and the *Employer* passes copies of all Consents correspondence to the *Contractor*.

The *Contractor* shall:

- identify any changes which are required to *Employer's* Consent applications already included in the *Employer's* planning, environment and traffic Consents registers and related works;
- identify *Employer's* Consent applications not yet included in the *Employer's* planning, environment and traffic Consents registers for this contract that are needed to carry out the *works*;
- prepare and compile *Employer's* Consent applications, including all necessary information listed in the tables in Appendices 3A, 3B and 3C;
- submit *Employer's* Consent applications to the *Project Manager* for acceptance allowing for the timescales identified in the tables in Appendices 3A, 3B and 3C to ensure that *Employer's* Consents are obtained in good time without causing delay or disruption to the *works*;
- ensure that all proposed *Employer's* Consent applications are discussed with the Consent granting body, in conjunction with the *Project Manager*, prior to submission to the *Project Manager* and that the views of the Consent granting body are taken into account in the Consent application;
- ensure that *Employer's* Consent applications are of a sufficiently high standard to enable Consent to be granted by the Consent granting body; and
- negotiate any conditions on *Employer's* Consents with the Consent granting body, in conjunction with the *Project Manager*, and check that any conditions are achievable on receipt and, if the conditions are not achievable, the *Contractor* shall notify the *Project Manager* immediately and use all reasonable endeavours to resolve without needing to appeal or re-submit the Consent application.

Employer's planning Consents shall be submitted by the *Contractor* to the Consent granting body and any other required parties (e.g. statutory consultees) after the *Project Manager's* acceptance. The *Contractor* shall obtain a written or emailed receipt from the Consent granting body to confirm that it has received the Consent application;

Employer's environmental and traffic Consents shall be submitted by the *Employer* to the Consent granting body and any other required parties (e.g. statutory consultees) after the *Project Manager's* acceptance;

The *Employer* will pay any fees relating to the submission of *Employer's* planning, environmental and traffic Consents directly to the Consent granting bodies.

3.3 *Contractor's* Planning, Environment and Traffic Consents

The *Contractor* shall:

- obtain all *Contractor's* Consents;

- ensure that all proposed *Contractor's* Consent applications are discussed with the Consent granting body, in conjunction with the *Project Manager*, prior to submission to the *Project Manager*;
- submit all *Contractor's* Consent applications to the *Project Manager* for review at least 14 days prior to submission by the *Contractor* to the Consent granting body;
- additionally submit traffic Consents, to the Traffic Liaison Group prior to submission by the *Contractor* to the Consent granting body;
- submit *Contractor's* Consents to the Consent granting body;
- provide to the *Project Manager* copies of all *Contractor's* Consents applications and all relevant records of correspondence, meetings, assurances, commitments to or by Consent granting bodies and Consents obtained immediately on submission or receipt and maintain a record of the original copies;
- negotiate any conditions on *Contractor's* Consents with the Consent granting body and check that any conditions are achievable on receipt and, if the conditions are not achievable the *Contractor* shall notify the *Project Manager* immediately and use all reasonable endeavours to resolve without needing to appeal or re-submit the Consent application; and
- immediately notify the *Project Manager* if a *Contractor's* Consent is not granted, and take the *Project Manager's* views into account when deciding whether to appeal within the statutory appeals process.

Further requirements for *Contractor's* environmental Consents are provided in the Volume 2B Part 21 Environmental Management of the Works Information.

The *Contractor* shall pay any fees relating to the submission of *Contractor's* Consents to the Consent granting bodies.

3.4 All Planning, Environment and Traffic Consents

3.4.1 General

The *Contractor* shall:

- identify all Consents required for the *works*;
- not start the *works* or any part of the *works* for which a Consent is required, until the Consent has been obtained and maintain a copy of all granted Consents in the Site offices;
- cooperate with the *Project Manager* in providing attendance at regular meetings with Consent granting bodies as arranged by the *Project Manager*;
- ensure that the *works* are undertaken in accordance with Consents obtained, (including without limitation timescales and conditions) and taking account of all informatives imposed by any Consent granting body in the granting of Consents;

- provide evidence that any conditions imposed on the Consent as part of granting have been discharged;
- appoint a Consents Coordinator; and
- develop and implement a Consents Management Plan (see 3.4.3 below).

The *Contractor* shall include the following in the *Project Manager's* reporting requirements for dashboard reporting:

- Confirm that all required environment, planning and traffic Consents are in place for the next two periods. Where a Consent is not yet in place, give actions to be taken in the next period to obtain the Consent. For Section 61 Consents also include dispensations and variations for the next period

3.4.2 Consents Co-ordinator

The *Contractor* shall appoint a Consents Co-ordinator. The Consents Co-ordinator shall:

- prepare, implement, maintain and update the Consents Management Plan;
- be the main point of contact for all Consent matters and cooperate with the *Project Manager* in all matters relating to Consent applications and compliance;
- ensure that the dates included in all Consents registers are the same as those included in the *Contractor's* Accepted Programme; and
- ensure the *Contractor's* team is aware of the status of all Consent requirements such that the *works* or any part of the *works* for which Consent is required are not commenced until Consent is granted or relevant conditions complied with.

3.4.3 Consents Management Plan

The *Contractor* shall produce a Consents Management Plan and submit it to the *Project Manager* for acceptance prior to the start of construction work. In the case of the first submission of the Consents Management Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*.

The Consents Management Plan shall describe the roles, responsibilities and the process for management of all Consents and shall include:

- acknowledgement of the requirement for cooperation and the process for liaison with the *Project Manager* regarding *Employer's* Consents;
- details of the processes and procedures for the identification of Consents and the management and maintenance of the Consent registers ,

- a process for updating and submitting revised registers to be submitted to the *Project Manager* on a 2-weekly basis;
- details of the processes and procedures for preparing *Contractor's* Consent applications for submission to the Consent granting body by the *Contractor*;
- details of the processes and procedures for preparation of all *Employer's* Consents taking into account that planning Consent applications are submitted by the *Contractor* to the Consent granting body and any consultees, but that *Employer's* traffic and environmental consent applications are submitted by the *Employer* to the consent granting body;
- a list of Consent granting bodies, including principal contacts, to whom submissions shall be made by the *Contractor* ;
- procedures that require the *Contractor* to develop Method Statements that comply with Consent applications and any conditions;
- procedures for ensuring compliance with all Consents, including briefing all staff of Consents requirements and monitoring of compliance through inspection and audit; and
- procedure for non-compliance with Consents, including reporting as an incident.

The *Contractor* shall review and update the Consents Management Plan as necessary as the *works* progress to ensure it reflects the current status of the *works*. The revised plan shall be submitted to the *Project Manager* for acceptance.

3.5 Appendices

Appendix 3A	<i>Employer's</i> Planning Consents
Appendix 3B	<i>Employer's</i> Environmental Consents
Appendix 3C	<i>Employer's</i> Traffic Consents

Part 4 – Undertakings and Assurances

4.1 General

During the passage of the Crossrail Bill through Parliament a large number of undertakings and assurances were given to third parties affected by the Programme.

The commitments contained within these undertakings and assurances, which affect both the design and construction of the Project, are recorded in a register. This register is available for the *Contractor* to access as follows:

- through the public register at: <http://www.crossrail.co.uk/railway/getting-approval/crossrail-act-register-undertakings-assurances>; and
- through the *Employer's* Commitments Delivery Tracker system (CDT) at <https://crlpdsecure.supportaps.net/login.aspx>.

As the nominated undertaker the *Employer* is required to comply with all the commitments made and recorded in the Register of Undertakings and Assurances.

Specific commitments applicable to the *works* have been incorporated into the Works Information as follows:

- where relevant to the design of the *works*, the commitments have been incorporated in the drawings and specifications in Works Information Volume 2C;
- where the commitments are relevant to how the *Contractor* Provides the Works and the commitments impact the Project as a whole, they have been incorporated in Works Information Volume 2B; and
- where the commitments are relevant to how the *Contractor* Provides the Works but affect specific contracts only, they are listed in Volume 2A of the Works Information.

4.2 The *Employer's* Commitments Delivery Tracker system

The *Employer* will provide the *Contractor* with access to the *Employer's* Commitments Delivery Tracker (CDT) system. The *Employer* will be responsible for support and maintenance (including database administration) of the hardware and software forming the CDT system. The *Contractor* shall nominate users for the CDT system. The *Project Manager* will provide initial training in the use of the CDT system to the *Contractor's* nominated users on a 'train the trainer' basis.

The *Contractor* shall notify the *Project Manager* immediately of any changes to personnel or roles that necessitates changes to user accounts on the CDT system. It will be the responsibility of the *Contractor* to train any further users.

Any updates to the *Employers* CDT system made by the *Employer* will be communicated to the *Contractor*.

4.3 The *Contractor's* Responsibilities

4.3.1 General

Where the *Contractor* considers that there are further commitments not identified in the Works Information that may affect how the *Contractor* Provides the Works, it shall raise an early warning.

The *Contractor* shall notify the *Project Manager* when it considers the obligation under any commitment has been discharged.

Prior to achieving Completion, the *Contractor* shall be required to demonstrate it has complied with the Commitment Compliance Plan.

4.3.2 The Commitment Compliance Plan

The *Contractor* shall produce a Commitment Compliance Plan for the contract and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Commitment Compliance Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*.

The *Contractor* shall not commence work on site until the *Project Manager* has accepted the Commitment Compliance Plan.

The Commitment Compliance Plan shall include (but not necessarily be limited to):

- all the commitments identified in the Works Information;
- any other commitments identified by the *Contractor* that affect how the *Contractor* Provides the Works;
- a description of the procedures required to comply with each commitment identified;
- identification of documentation to be submitted as evidence to discharge obligations resulting from each commitment and frequency of recording and providing such evidence;
- the processes for regular communication and discussion of commitments with personnel, such as through toolbox talks; and
- the processes for liaison and communication with subcontractors and the suppliers of any tier of the commitments.

The *Contractor* shall train all operatives, with direct and indirect responsibilities under the Commitment Compliance Plan, on the contents.

The *Contractor* shall review and update the Commitment Compliance Plan to ensure that it remains suitable, adequate and effective. The *Contractor* shall update the Commitment Compliance Plan at least every 6 months.

The revised Commitment Compliance Plan shall be submitted to the *Project Manager* for acceptance and the *Contractor* shall keep a record of reviews of the Commitment Compliance Plan.

4.3.3 Inclusion of Commitments in the Accepted Programme

The *Contractor* shall include those commitments with specified timescales for compliance and any commitment identified by the *Contractor* that affect how the *Contractor* Provides the Works in the Accepted Programme indicating:

- when the obligations under the commitment must be enacted;
- when the commitment will be discharged; and
- any processes, *Project Manager* acceptance and third party approvals required to enact and discharge the commitment.

4.3.4 Records of Compliance with Commitments

The *Contractor* shall upload the description of the procedures required to comply with each commitment identified in the Commitment Compliance Plan onto the *Employer's* CDT system. The *Contractor* shall ensure the procedure descriptions are revised in accordance with revisions to the Commitment Compliance Plan.

The *Contractor* shall upload documented evidence to the *Employer's* CDT system at the intervals identified in the Commitment Compliance Plan to demonstrate ongoing compliance with each commitment and that the *Contractor* has discharged each commitment by the earlier of:

- the specified timescales in Volume 2A of the Works Information;
- the timetable instructed by the *Project Manager* for commitments identified by the *Contractor*,
- or within 5 working days of completing the relevant works

4.3.5 Dashboard Reporting

The *Contractor* shall produce a periodic Key Performance Indicator on performance against the agreed Commitments Compliance Plan. The report shall include:

- Any areas of non-compliance with the Commitment Compliance Plan and corrective actions taken or planned to be taken.

- Status of any corrective actions raised from the Potential Incident Report (i.e. open/ closed/ overdue). If overdue, provide reasons and actions to ensure closure in next period.
- Confirmation that all planned compliance evidence was uploaded onto the *Employer's* CDT system.

4.4 Third Party Involvement

Where an item in the Register of Undertakings and Assurances requires notification to or consultation with Others, the *Project Manager* shall make arrangements for such notification or consultation, which may involve the *Contractor*.

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Part 5 - Utilities

5.1 Introduction

The Crossrail Act 2008 sets out the requirements for Utility Works. For the purposes of this part of the Works Information, Utility Works means the diversion, relocation and/or protection of above or below ground utility apparatus located in the public highway or private land.

Utility Works in the public highway will be undertaken using the powers contained in the New Roads & Street Works Act 1991 (NRSWA) whilst Utility Works in private land will be undertaken using the powers contained in the Crossrail Act 2008.

This part of the Works Information describes the *Employer's*, *Project Manager's* and *Contractor's* responsibilities in relation to Utility Works.

5.2 The *Employer's* Responsibilities

The *Employer* is responsible for the implementation of Utility Works required to deliver the *works* except where explicitly stated otherwise in the Works Information. This includes:

- liaison with the utility owner and other statutory undertakers;
- co-ordination of Utility Works;
- obtaining consents for Utility Works; and
- implementing the Utility Works.

In discharging its responsibilities the *Employer* will:

- request records from the relevant statutory undertakers;
- undertake non-intrusive surveys (for example ground penetrating radar surveys);
- undertake trial pit and trial trench excavations to determine the actual location and extent of services;
- identify the required Utility Works and agree them with the relevant statutory undertakers;
- develop with the statutory undertakers details of the Utility Works for each utility apparatus (including drawings and specifications);
- develop co-ordinated Utility Works plans with the statutory undertakers;
- plan the implementation of the Utility Works;

- agree with the statutory undertakers who will implement the Utility Works on a case by case basis;
- engage framework contractors to implement Utility Works;
- commence and/or complete specific Utility Works as part of advance and enabling works packages; and
- instruct statutory undertakings to commence and/or complete specific works packages.

Ensure that design information acquired through surveys and trial holes and updates from statutory undertakers are uploaded into *Employer* maps and made available for the *Contractor* to use.

The extent to which all of the above have been started or completed varies between sites and utility apparatus. Details of the Utility Works required for this contract and the extent to which they have been completed can be found in Volume 2A of the Works Information.

The current location of utility apparatus is shown on the drawings in Volume 3 Site Information.

5.3 The *Contractor's* Responsibilities

5.3.1 General

In providing the *works* the *Contractor* shall:

- satisfy itself of the accuracy of the information provided and in particular the location of existing or diverted utility apparatus;
- survey, locate and confirm the details of all utility apparatus in the vicinity of the works or affected by the works, whether within the Site, the Working Areas or on the public highway;
- produce records and drawings indicating the location and details of all utility apparatus within the Site and/or the Working Areas or affected by the works;
- immediately notify the Project Manager in the event that uncharted utility apparatus is found and record the location and details on a drawing;
- implement and operate a Permit to Dig process;
- where stated in the Works Information, identify and adequately protect all utility apparatus liable to be exposed or to remain exposed or be affected during delivery of the works;
- not interfere with the operation of utility apparatus without prior consent from the apparatus owner;

- afford clear and uninhibited access to the utility apparatus owner for any of their apparatus located within the Site and/or the Working Areas or affected by the works;
- comply with the specific procedures/processes prescribed by the Statutory Undertakers when working on or close to their assets;
- identify any other Utility Works, temporary or permanent, required as a result of Providing the Works including those resulting from occupation of additional Working Areas it proposes to use;
- arrange the temporary site utility supplies other than those identified to be provided by the *Employer*;
- communicate and co-ordinate with Others undertaking Utility works on behalf of a Statutory Undertaker; and
- obtain all required consents, liaise with the Statutory Undertaker, communicate and co-ordinates with Others where the *works* include the execution of Utility Works.

5.3.2 Health and Safety

This section shall be read in conjunction with Part 19 Health and Safety Management of Volume 2B of the Works Information.

Damage to underground and overhead utility apparatus can cause fatal or severe injury and is a particular hazard for construction activities. The *Contractor* shall ensure that all reasonable precautions are taken in Providing the Works to eliminate this hazard. This shall include but not be limited to:

- complying with the requirements of 5.3.1 above;
- developing a safe system of work including the implementation and operation of a Permit to Dig process;
- providing specific training for all employees to highlight the hazards and danger from utilities apparatus and explain the safe system of work;
- compliance with the requirements of HSG47 – Avoiding Danger from Underground Services; and
- using personnel protective equipment which address the specific hazards posed by utility apparatus, e.g. flame retardant clothing.

5.3.3 Utilities Personnel

The *Contractor* shall appoint a Utilities Co-ordinator. The *Contractor* shall submit a staffing plan for all utilities personnel as part of the Utilities Plan for the *works*.

5.3.4 Utilities Coordinator

The Utilities Coordinator shall:

- be the principal logistics point of contact for utilities related activities;
- produce and implement the Utilities Plan;
- develop and provide utilities training for all personnel to include induction, tool box talks and specific training for personnel with logistics responsibilities,
- manage all utilities personnel;
- co-ordinate between utilities personnel and the construction teams;
- approve the utilities related elements of the *Contractor's* method statements;
- ensure compliance with utilities legal and contractual requirements;
- liaise with the *Contractor's* procurement personnel to ensure that procurement activities take due cognisance of utility requirements and risks;
- analyse individual utility related incidents and complaints to identify root causes, corrective and preventative actions needed, trends and strategic actions;
- manage logistics monitoring included in the Works Information or as required by consents, including analysis and interpretation of monitoring results and actions; and
- produce report information for the utilities part of the progress report and attend the progress meeting to ensure that the Utilities Plan remains suitable, adequate and effective;

The Utilities Coordinator shall have the following competencies:

- appropriate experience of utilities management, including site experience on construction projects;
- experience of the NRSWA;
- experience of liaising with and co-ordinating statutory undertakers;
- good knowledge and practical experience of legal requirements and how to comply with them; and
- experience of liaison with stakeholders including local authorities, the police and Highways Agency.

5.4 Utilities Plan

The *Contractor* will develop a plan for managing the Utility works or as otherwise agreed with the *Project Manager*. This should include resource requirements, co-ordination of works and other relevant information relating to the works.

The *Contractor* shall not commence work on site until the *Project Manager* has accepted the Utilities Plan.

The Utilities Plan shall include:

- the management processes and procedures for complying with the legal and contractual requirements and other requirements of the Works Information;
- a staffing plan containing:
 - the roles and responsibilities including the job title of the nominated person responsible for each task;
 - the role fulfilled by the *key person*; and
 - a schedule identifying personnel employed directly, Subcontractors, full and part time personnel and the duration of their activity on the contract;
- the process for liaison and communication with Others, including other Project contractors and statutory bodies, where required by the Works Information;
- the processes for liaison and communication with subcontractors and suppliers or any tier and ensuring compliance with the minimum requirements of the Works Information;
- the *Contractor's* programme for training, site inspections, audits and consents submissions;
- the process for identifying, planning and implementing Utility Works;
- details of temporary works which may affect utilities, mitigation measures and details of how this will be communicated to the Statutory Undertakers in order to seek their acceptance;
- details of personnel protective equipment specific to Utility Works and other Health and Safety measures;
- a Permit to Dig procedure;
- details to ensure compliance with NRSWA and the Crossrail Act 2008;
- details of and process for complying with the requirements of *Contractor* Identified Utility Works; and

- details and process for complying with the requirements of Utility Works Implemented by the *Project Manager* or Statutory Undertaker.

Contact details for the Statutory Undertakers responsible for each utility apparatus will be provided by the *Project Manager*.

The *Contractor* shall ensure the plan is appropriate to all activities included in the *works*.

The *Contractor* shall train all employees, including subcontractors and suppliers of any tier, with direct or indirect responsibilities under the plan, on the contents of the plan that apply to its work.

The *Contractor* shall review and update the plan to ensure it remains suitable, adequate and effective as the *works* progress, ensure that it reflects the current status of the *works* and:

- following any material change to the status of the *works* or site that has an impact on logistics requirements;
- as instructed by the *Project Manager*, and
- at least every 6 months.

The revised plan shall be submitted to the *Project Manager* for acceptance.

5.5 Utility Works Using the New Roads & Street Works Act 1991

Utility Works in the public highway will be undertaken using the powers contained in the NRSWA and in particular Highway Authorities & Utilities Committee (HAUC) Code of Practice – Measures Necessary Where Apparatus is Affected by Major Works (Diversionary Works).

Appendix C of this HAUC Code of Practice details the process to be followed from identifying utility works to completion of those works.

With reference to Part 3 Planning, Environmental & Traffic Consents of Volume 2B of the Works Information, the *Employer* will serve all notices required under NRSWA except for those requiring *Contractor* consents. The *Contractor* shall provide all necessary information to the *Project Manager* to allow the *Employer* to serve those notices and instruct the implementation of the Utility Works and/or gain the required consents. The *Contractor* shall take due cognisance of the time taken to serve notices and implement the Utility Works and/or obtain such consents when planning the works.

5.6 Utility Works Using the Crossrail Act 2008

Utility works in private land will be undertaken using the powers contained in the Crossrail Act 2008 and in particular:

- Schedule 17 part 2 – Protection for Electricity, Gas, Water and Sewerage Undertakers; and

- Schedule 17 part 4 – Protection of Electronic Communications Code Networks.

These provisions of the act require that notice is given to the relevant Statutory Undertaker not less than 28 days before commencing to construct any work authorised by the act which is near to, or will or may affect, any utility apparatus which has not been required to be removed under other provisions of the act. The *Contractor* shall submit to the undertakers and the *Project Manager* a plan and description of the work and details of any protective measures which the *Contractor* proposes to take in respect of the apparatus, together with a specification of the measures where appropriate.

With reference to Part 3 Planning, Environmental & Traffic Consents of Volume 2B of the Works Information, the *Employer* will serve all notices required under the act except for those requiring *Contractor* consents. The *Contractor* shall provide all necessary information to the *Project Manager* to allow the *Employer* to serve those notices and instruct the implementation of the Utility Works and/or gain the required consents. The *Contractor* shall take due cognisance of the time taken to serve notices and implement the Utility Works and/or obtain such consents when planning the works.

5.7 **Contractor Identified Utility Works**

The *Employer* has identified the Utility Works required to deliver the works and has taken the appropriate steps to implement those Utility Works.

If in Providing the Works the *Contractor* identifies that further Utility Works will be required, it notifies the *Project Manager* of the additional Utility Works and provides details of the nature and extent of the Utility Works prior to making contact with the relevant Statutory Undertaker. The *Project Manager* will make the initial contact with the Statutory Undertaker and may authorise further communication to be made directly by the *Contractor*.

Where the *Contractor* identifies that further Utility Works are necessary, the *Project Manager* will instruct the *Contractor* on who will be responsible for implementation of the Utility Works.

Before commencing any work which is near to, or will or may affect any utility apparatus, and which requires additional Utility Works, the *Contractor* shall submit to the *Project Manager* for acceptance:

- a plan and description of the works including the additional Utility Works; and
- details of any protective measures to be undertaken in respect of the utility apparatus and a specification of those measures.

The *Contractor* shall not commence the relevant works until he has received approval from the Statutory Undertaker and acceptance from the *Project Manager*.

For *Contractor* identified additional Utility Works, the *Contractor* shall:

- demonstrate to the *Project Manager* that implementing the Utility Works is the most cost effective and efficient solution;

- agree with the *Project Manager* and Statutory Undertaker that the Utility Works are required and that the *Contractor's* chosen method of working cannot be altered to avoid the Utility Works;
- in conjunction with the *Project Manager*, identify the authorising process (i.e. NRSWA or the Crossrail Act 2008) and the specific notices and undertakings and assurances required as part of that process;
- incorporate the Utility Works into the programme which shall then be submitted for acceptance and ensure that sufficient time is allowed in the programme for the *Employer* and *Contractor* to serve the relevant notices, obtain the necessary consents, provide the required information to enable those consents to be granted and implement the Utility Works;
- obtain agreement to the Utility Works from the Statutory Undertaker and *Project Manager*, and
- agree with the statutory undertaker and *Project Manager* who shall implement the Utility Works (the *Contractor*, other Project contractors or the statutory undertaker).

If the *Contractor* implements the Utility Works then he shall:

- produce a design for the civil engineering scope of the proposed Utility Works and submit it to the *Project Manager* for acceptance and for approval from the relevant statutory undertaker;
- use a Subcontractor approved by the statutory undertaker and with appropriate Lloyds accreditation to undertake the Utility Works;
- develop a detailed implementation plan for the Utility Works and agree it with the statutory undertaker and *Project Manager*;
- comply with the specific procedures/processes prescribed by the Statutory Undertakers when working on or close to their assets;
- ensure the statutory undertaker inspects the Utility Works as it is implemented;
- obtain approval from the statutory undertaker that the Utility Works are to the required standard and will be adopted by the statutory undertaker;
- arrange for the statutory undertaker to implement any connections or disconnections to their network where the Statutory Undertaker requires that they make their own connections/disconnections; and
- produce as-built records of the Utility Works including drawings, specifications, inspection and test certificates.

5.8 Utility Works Implemented by the *Employer* or Statutory Undertaker

If the *Employer* or statutory undertaker implements the Utility Works then the *Contractor* shall:

- provide site and welfare facilities as required by the *Project Manager*;
- act as Principal Contractor under the CDM Regulations for Utility Works within the worksite or Working Areas for which it is identified as Principal Contractor;
- incorporate sufficient time for the Utility Works into the Accepted Programme;
- not alter the programme for the Utility Works without prior approval from the *Project Manager*; and
- afford clear and uninhibited access to the statutory undertaker or other Project contractors to allow them to complete the Utility Works in a timely and efficient manner.

Where appropriate, co-ordinate these works with other works within their remit and liaise with the Statutory Undertaker accordingly

5.9 Temporary Site Utility Supplies

The *Contractor* is responsible for arranging all its temporary Site utility supplies required to Provide the Works directly with the relevant utility supply except where Site supplies have already been arranged by the *Employer*. This includes:

- specifying supply requirements;
- agreeing supply requirements and implementation details (programme, location, costs, etc) with the relevant service provider;
- environmental assessments;
- notices; and
- consents.

5.10 Settlement and Ground Movement

The *Employer* has assessed the impact of predicted ground movement on utility apparatus. These predictions are based on the parameters detailed in Part 2 of Volume 2C of the Works Information. The *Employer* has implemented Utility Works based on these predictions, details of which are contained in Volume 2A of the Works Information.

If the *Contractor* requires additional Utility Works then he shall comply with the requirements of 5.7 and the Works Information before undertaking any *works* which may cause settlement or ground movement that impacts on utility apparatus.

5.11

Utilities Works Responsibility Matrix

The following table summarises the key responsibilities between the *Employer* and *Contractor* for all utility works:

Works Information 2B - Part 5						
Key: I = Identify D = Design and Construction M/C = Manage and Construct E = Employer C = Contractor						
	Responsibility	TWUL	UKPN	BT	NGG	SGN
	I	E	E	E	E	E
Direct Clashes	D	E	E	E	E	E
(No change with permanent works)	M/C	C	E	E	C	E
	I	E	E	E	E	E
Settlement Mitigation	D	E	E	E	E	E
(No change with permanent works)	M/C	C	E	E	C	E
	I	E	E	E	E	E
Permanent Services	D	E	E	E	E	E
(No change with permanent works)	M/C	C	E	E	C	E
	I	C (for additional temp services)				
Infrastructure and Services	D					
(Temporary Services other than in Vol 2A = Change)	M/C					
	I	C				
Required by Contractors Method or Temporary Works Change	D					
	M/C					

Part 6 – Setting out

6.1 Introduction

All survey, setting out and monitoring shall be undertaken using horizontal and vertical control directly related to the *Employer's* project survey control as defined below.

Before commencing work in the Site and/or the Working Areas the *Contractor* shall consult with the *Project Manager* to ensure an understanding of the survey control system and the survey requirements in the Crossrail Standard CR-STD-010 – London Survey Grid.

6.1.1 Not Used

6.1.2 Survey and Setting Out Equipment

The *Contractor* shall use Equipment that is appropriate for the task and is maintained, checked and calibrated in accordance with the manufacturer's specification. The *Contractor* shall maintain a record of all checks and calibrations on all survey Equipment and make this record available for inspection by the *Project Manager* upon request

6.2 Project Controls

6.2.1 Survey Grid

All survey, setting out and associated calculations shall be carried out on the London Survey Grid established by the *Employer* and defined in the Crossrail Standards Baseline and in particular Crossrail Standard CR-STD-010 – London Survey Grid.

6.2.2 Vertical Datum

Within the central London area, the vertical datum for the *works* is nominally 100 metres below OS Newlyn and defined by a series of deep bench marks along the route of the Crossrail Tunnels. From these deep bench marks a series of first order bench marks located at approximately 500 metre intervals have been established outside the anticipated 10mm settlement contour and generally within the 1mm settlement contour indicated of the route settlement contour drawing in Part 1 of Volume 2C of the Works Information. The *Project Manager* will notify the *Contractor* of the location of the bench marks to be used for this contract. All vertical control shall be referenced to these bench marks.

6.2.3 Primary Survey Control Points

The *Project Manager* shall be responsible for maintaining the network of primary horizontal and vertical control points generally located within the 1mm settlement

contour indicated on the route settlement contour drawing in Part 1 of Volume 2C of the Works Information. The *Project Manager* will notify the *Contractor* of the location of the primary horizontal and vertical control points to be used for this Contract by the relevant *access date*. The *Contractor* shall carry-out his own checks on the supplied control points and submit a report on his findings within 6 weeks of the relevant *access date*. Any discrepancies found shall be resolved with the *Project Manager*.

6.3 Principal Site Control

6.3.1 Horizontal Site Survey Control

The *Contractor* shall establish secondary horizontal site control points derived from the primary control points to enable the setting out of the *works*.

The construction and location of individual monuments shall be proposed by the *Contractor* and submitted for the *Project Manager's* acceptance. The monuments shall be located in such a way so as to avoid movement or damage. Each monument shall be observable from a minimum of two other monuments, with no grazing rays, and shall be part of a network.

The *Contractor* shall design, install and maintain the secondary horizontal site control points. The *Contractor* shall submit the frequency of checking individual monuments against the primary survey control points to the *Project Manager's* acceptance. The *Employer* shall take over the *Contractor's* secondary horizontal site control upon the *Employer* taking over the *works*, for use by Others.

6.3.1.1 Instrumentation and Observation

The *Contractor* shall use a total station with angular accuracy of one second or better and distance measuring accuracy of 1mm + 1.5ppm.

Each set of observations shall be a minimum of four rounds of angles and distances, with an angular spread of six seconds or less. Where ever possible reciprocal distances shall be observed with agreement being 2mm or better.

Temperature and pressure shall be recorded for each set of observations and the appropriate corrections applied to the measured distances.

6.3.1.2 Computations

The *Contractor* shall carry out computations using a rigorous least squares method.

All local horizontal control networks shall be established to a closure proposed by the *Contractor* for each task and submitted to the *Project Manager*.

6.3.1.3 Results

Horizontal control results including closure, network diagrams, and co-ordinate listings with witness diagrams of permanent ground markers established for horizontal setting out and survey shall be submitted to the *Project Manager*

Original data shall be submitted in an acceptable format suitable for processing in a standard survey least squares computer software package.

6.3.2 Vertical Site Survey Control

The *Contractor* shall establish secondary vertical site control points derived from the primary bench marks to enable the setting out of the *works*.

The construction and location of individual bench marks shall be proposed by the *Contractor* and submitted for the *Project Manager's* acceptance. The monuments shall be located in such a way so as to avoid movement or damage. Monuments for horizontal control may also be used as bench marks for vertical control if designed appropriately.

The *Contractor* shall design, install and maintain the secondary vertical site control points. The *Contractor* shall submit the frequency of checking individual bench marks against the primary survey control points to the *Project Manager's* acceptance. The *Employer* shall take over the *Contractor's* secondary vertical site control upon the *Employer* taking over the *works*, for use by Others.

6.3.2.1 Instrumentation and Observation

Levelling shall be carried out using a precise digital level with a standard deviation height difference per 1km double run of 0.3mm using invar staffs and 1.0mm with standard staffs. Invar staffs shall be used for all primary levelling.

All levelling shall be double run with closures of $2\text{mm}+3\text{mm}\sqrt{\text{km}}$ (square root km) or better.

6.3.2.2 Computations

Levels shall be adjusted to the given values for the *Employer's* first order bench marks, and values assigned to each new bench mark.

6.3.2.3 Results

Vertical control results including closure, adjustments, network diagrams, listings of bench mark values with witness diagrams of monuments established for vertical setting out and survey shall be submitted to the *Project Manager*. Where the horizontal control points also act as bench marks only one witness diagram is required.

6.3.3 Tunnel Control

Instrumentation, observation, computations and deliverables for horizontal and vertical control for tunnel control shall be as specified 6.3.1 and 6.3.2 above.

The *Contractor* shall locate the survey control points within the tunnels to take into account the location of temporary and permanent services. The construction and location of individual survey control points shall be proposed by the *Contractor* and

submitted for the *Project Manager's* acceptance. The monuments shall be located in such a way so as to avoid movement or damage.

The *Contractor* shall design, install and maintain the tunnel control points. The *Contractor* shall propose the frequency of checking tunnel control points against the primary survey control points for the *Project Manager's* acceptance. The *Employer* shall take over the *Contractor's* tunnel control points upon Completion for use by Others.

6.3.3.1 Transfer of Control into the Tunnel

The *Contractor* shall propose the method for transferring both horizontal and vertical control into the tunnel for acceptance by the *Project Manager*. The method used will be dependant on site configuration and access to the tunnel. More than one method or a combination of methods may be used.

6.3.3.2 Horizontal Tunnel Control

The *Contractor* shall establish a network of demountable tables, with a centring accuracy better than 0.25mm along the tunnel axis with suitable stable platforms to enable safe access for observations to be taken. The exact configuration of the network will depend on the tunnel alignment, however grazing rays, and sights along the tunnel wall shall be avoided.

The *Contractor* shall use bench marks of a type acceptable to the *Project Manager* installed at regular intervals along the tunnel and at not more than every 50 metres.

6.4 Survey Station Numbering

The *Contractor* shall propose for acceptance by the *Project Manager* a unique numbering system for the principal site and tunnel control points. This number is to be clearly visible at all times.

6.5 General Site Survey and Setting Out

All site survey and setting out data shall be directly traceable to the established principal site and tunnel survey control points.

All site survey and setting out shall be carried out to an accuracy appropriate to the particular phase of the construction, after consultation with the *Project Manager*.



Part 7 – Not Used

Learning Legacy Document

Part 8 – Incident Management

8.1 General

An incident is an unplanned, undesired event that resulted in (or could have resulted in) harm to people; damage to or loss of, property; or harm or damage to the environment, or the potential for regulatory action or significant disruption or reputational damage to the programme.

The *Employer* has an incident management process in order to avoid or minimise harm or damage; minimise risks of legal action, additional costs and delays to programme; and to protect its reputation. The key tenets of this process are explained in this Part of the Works Information and include:

- A single process for the management of all events that constitute an incident, with defined levels to help frame the response – Levels 1 to 4, with Level 1 being the most serious incidents;
- A three-tier incident response command structure (Gold, Silver, Bronze) to manage an incident, with the *Employer* providing on call staff for Gold and Silver, and the *Contractor* providing the Bronze command and management response;
- An Incident Response Desk (IRD), run by the *Employer*, to start the coordination of the *Employer's* response to an incident and to support the *Contractor* where appropriate. The Incident Response Desk is the first point of contact (0203 197 5000) to the *Employer* for all Level 1 to 3 incidents on the Project;
- Detailed and effective planning by the *Employer* and *Contractor*, agreed, disseminated and tested, to explain how an incident will be managed, described below;
- An incident reporting system (Rivo) that records the details of an incident and supports communications, investigation and follow-up activities to avoid a recurrence.

The *Employer* also manages a Public Helpdesk. The Helpdesk operates a 24-hours a day, 365-days a year helpline (0345 602 3813) as the first point of contact for enquiries about the Project, and for complaints from the public. Whilst the Incident Response Desk and Helpdesk may interact to coordinate their activities, for the purposes of the incident management process they are considered separate. Helpdesk details are provided at Part 9 of Volume 2B of the Works Information.

8.2 Definitions

Dangerous occurrence – an incident that is listed within the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) and that requires reporting to the enforcing authority as a 'dangerous occurrence'.

Near miss - an incident that under slightly different circumstances could have resulted in harm to people, damage to property, harm, damage to the environment or regulatory action relating to legislation.

Harm or damage to the environment can include: pollution of, or damage to, surface water, groundwater or land; spills or leaks of oils or chemicals; damage to archaeology or heritage (non-listed); damage to wildlife, including protected species and habitats; excessive noise, dust and/or other air pollutants, light or vibration; or failure to control waste or excavated material.

8.3 Incident Levels

Incidents have a multitude of causes and effects. The type of incident might range from terrorist action directly or indirectly affecting a Site or working area, through major collapse of the Project's construction works and death or significant injury, to breaches of consents, and criminal activity. No method of categorisation can comprehensively cover all incidents and the categorisation of an incident may require judgement to account for the specific nature of the incident.

Incidents are categorised as Level 1, 2, 3 or 4, with Level 1 being the most serious and requiring an immediate response. The *Contractor* is responsible for defining the level of incident and reporting it to the Incident Response Desk. The Incident Response Desk may be able to advise the *Contractor* on the appropriate level. If in doubt as to the level of an incident, the *Contractor* shall deal with it at the highest potential level. When further information becomes available to revise the level, if necessary, the response may be reduced and the level amended by the *Project Manager*.

The incident levels are as follows:

Level 1:

- Death or life threatening injury;
- Injuries which are likely to prevent the injured party working again, or result in permanent disability;
- Incidents involving multiple casualties that have received serious injuries;
- Disruption to operational rail services;
- A major event (for example, a fire or explosion) on a Site, working area or property;
- A confirmed black condition occurs within underground construction;
- External events with the potential significantly to disrupt the Project's operations:

- Environmental, planning and traffic incidents which are not under control and/or have caused catastrophic harm or damage to the environment (and therefore a high likelihood of regulatory action);
- Significant negative media attention or the likelihood thereof.

Level 2:

- RIDDOR reportable events not captured in Level 1;
- Injuries to members of the public;
- A confirmed alarm for a red trigger level within underground construction;
- Injuries where lost time is expected to be greater than one day;
- Receipt of a statutory notice from a regulatory body;
- Where the final cost of any loss is likely to be excessive (for example, over £1 million);
- Significant crime, disorder or security incidents;
- Damage to operational rail assets, attributable to a contractor working on the Project;
- A major event (for example, fire or explosion) not on a Site, working area or property but that will impact on the operation of any such Site or property, or impact on the function of the Project;
- Media attention not defined as significant;
- High potential to have caused death or serious injury;
- Environmental, traffic and planning incidents that have or may cause significant harm or damage; and/or attract a high likelihood of regulatory action; and/or have significant prejudicial effects on the free flow of traffic.

Level 3:

- Minor injuries requiring first aid which also result in lost time;
- A confirmed alarm for an amber trigger level from manual or instrumental monitoring;
- Near misses with significant potential of harm, damage or loss;
- Breach of a Project Golden Rule;
- Crime and security incidents not captured in Level 2;
- Environmental, traffic and planning incidents that have or may: cause minor harm or damage; and/or attract a low likelihood of regulatory action; and/or have minor prejudicial effects on the free flow of traffic;

- An event on a neighbouring property or operational rail assets (not attributable to a Project contractor) that directly affects the ongoing delivery of the Project Programme.

Level 4:

- Minor injury requiring first aid but no time lost;
- An event, prevented from occurring through effective implementation of arrangements described in the *Contractor's* plans (low level near miss or a hazard);
- Drug and Alcohol failures (all types) are recorded on a separate register maintained by the *Project Manager*.

8.4 Organisation and Responsibilities

In concert with the emergency services, the *Employer* has adopted a three-level incident response structure using Gold, Silver and Bronze functions. The duty on-call rota is held by the Incident Response Desk. The incident response structure is arranged as follows:

Gold on-call manager – Director nominated by the *Employer*, usually based at the Project's Head Office:

- Incidents notified to them by the Silver On Call Manager and the Incident Response Desk;
- Leads the *Employer's* response to incidents;
- Responsible for overall direction of the *Employer's* resources, for the protection of the *Employer's* reputation and for managing the wider impacts from the incident on the *Employer* (for example the *Employer's* relationship with its' sponsors, with Government and with the media).

Silver on-call manager – Manager nominated by the *Employer*, can be based at Head Office or on Site but not necessarily where the incident occurred:

- Incidents notified to them by the Incident Response Desk, and/or by the *Project Manager*;
- Manages the *Employer's* response;
- Assesses the situation and reports to Gold on-call manager the status of the incident response.

Bronze on-call manager – manager nominated by the *Contractor*, based on the Site where the incident occurred:

- Lead the *Contractor's* response on Site and working areas to incidents
- Responsible for incident management, including where appropriate liaison with the emergency services

- Provide regular updates to the Silver on-call manager (usually through the Incident Response Desk) and *Project Manager*, and formally reports the incident through Rivo and by telephone within agreed timelines.

The *Contractor's* responsibilities described in this Part of the Works Information includes incident planning, incident response, investigation and review. The *Contractor* shall:

- Adopt the incident levels specified in this part of the Works Information;
- Produce an Incident Plan, setting out the *Contractor's* arrangements for the prevention and management of an incident;
- Put in place organisational arrangements and control measures to manage incidents;
- In the event of an incident, respond rapidly and effectively, undertake notifications and gather evidence;
- Investigate all incidents to ensure that all lessons are learnt and implemented to avoid recurrence;
- Regularly review incident records to identify trends and actions.

No acts or omissions by the *Project Manager* or the *Employer* shall reduce, extinguish, exclude, limit or modify the *Contractor's* duties and obligations under this contract and Applicable Law.

8.5 Planning

8.5.1 Incident Plan

The *Contractor* shall submit an Incident Plan to the *Project Manager* for acceptance prior to the start of works. The *Contractor* shall not commence works until the Incident Plan is accepted by the *Project Manager*.

The *Contractor* shall review and where appropriate, resubmit the Plan to the *Project Manager* for acceptance at each of these times or events:

- Before the *Project Manager* gives the Contractor 'Permission to Mobilise' and agrees 'Start of Works' (as specified in Part 19 of this Works Information);
- Before the *Project Manager* issues the 'Site Start Work Checklist' for any major element of the Works (as specified in Part 19 of this Works Information);
- Whenever there is a significant change to the site conditions (for example a change in scope, site area or construction methods being used); and
- At least every 6 months in order to maintain its effectiveness.

The scope of the Incident Plan shall include, but not be limited to:

- Definitions as specified in Part 2 of this Works Information that are relevant to incidents and are used in the plan;
- Incident levels as specified in this part of the Works Information;
- Scope of works;
- Site and working areas layout, boundaries and environment, covering each Site and working areas, including the layout of the Site and working areas in the event of a major incident;
- *Contractor's* organisation, responsibilities, contact details and call out procedures, showing how the interfaces with the Project and other third parties are managed;
- Contact numbers for the *Contractor's*, *Project Manager's* and enforcing authorities' and emergency services' key personnel, and any others to be used in the event of an incident, provided in one or more Incident Response Arrangement Form(s);
- Potentially high risk and/or high profile hazards;
- Examples of potential incidents of each type and level, including details of typical responses, and emergency and other procedures;
- The management of significant, third party interfaces, including for example with the emergency services, operational railway and local authorities;
- Processes for incident planning, incident response, incident notification, media liaison, incident recovery, investigation and review as set out in this part of the Works Information;
- Processes for compliance with legal requirements;
- Location of and routes to and from the nearest Accident and Emergency hospital and other emergency facilities;
- Process by which the *Contractor* will facilitate the attendance of the emergency services; and
- Method of compliance with the following:
 - Circumstances where work may be stopped until a revised working method can be implemented;
 - Advice on "Guidance on Development of a Site Clearance Capability in England and Wales" (ODPM, October 2005) and BS6164 Code of Practice for safety in tunnelling in the construction industry for works on the existing railway network, comply with established industry procedures;
 - Requirements of the Environment Agency's Pollution Prevention Guidance Note (PPG) 21 current at the Contract Date, including an up-to-date Site drainage plan and the *Contractor* shall update the Incident Plan and Site drainage plan when a new version of PPG21 is issued by the Environment Agency.

When producing the Incident Plan the *Contractor* shall consult with the emergency services, the operational rail authorities and with other key interfaces.

The *Contractor* shall ensure that the Incident Plan includes the emergency preparedness and response and nonconformity, corrective and preventive action requirements of its management system(s) in accordance with BS EN ISO14001 and OHSAS 18001 (or equivalent).

8.5.2 Incidents Affecting the Operational Rail Interface

The operational rail interface requires specific arrangements. The *Contractor* shall prepare a detailed procedure (often referred to as an Emergency Preparedness Plan) for dealing with emergencies on recognised interfaces on the operational rail. This procedure shall be accepted by the *Project Manager* and appropriate operational rail authorities (for example LUL, Network Rail, RfL) before work starts.

Actions in the event of an incident affecting the operational railway shall be set out on a poster to be prominently displayed in key locations agreed by the rail authority. These must include the method of stopping trains in the event of an incident that could affect the safety of trains and/or persons and, in the case of an electrified line, how to arrange to have the current switched off.

The *Contractor* shall immediately notify the *Project Manager* and the rail authority's Engineer of all incidents requiring notification to any local or central government authority or statutory authority arising under the terms of health and safety legislation.

8.5.3 Managing Security during an Incident

Many incidents require careful management of security interfaces between and across Sites and working areas.

The *Contractor* is required to liaise and coordinate on security issues with other Project contractors, and the *Employer's* Security Manager through the *Project Manager*, to ensure that the security interfaces are managed effectively and to allow the *Employer* to ensure that there is an overall strategy for dealing with incidents.

In circumstances where an incident or emergency affects more than one work Site or working area, the *Employer* may declare a 'Serious Security Incident'. In these circumstances, the *Contractor* may be required by the Silver on-call manager or the *Project Manager* to coordinate the responses and actions of secondary security contractors affected by such an incident. In the event that the *Employer* declares a Serious Security Incident, the *Project Manager* may instruct the temporary re-deployment of certain security guarding personnel in order to effect a prompt and effective response to the emergency elsewhere on the Project. The *Contractor* may also be instructed by the *Project Manager* to promptly reinforce Site security establishments with off duty personnel and other resources.

In the event of a Serious Security Incident or other emergency occurring outside normal working hours, it will be necessary for the *Contractor* to immediately recall key members of staff to the Working Areas. The *Contractor* shall identify key personnel to ensure adequate coverage of the Working Areas is maintained at all times.

The *Contractor* shall record all steps taken and resources deployed as a consequence of, or arising from, the *Employer's* declaration of a Serious Security Incident.

8.5.4 On-call rota and contacts

The *Contractor* shall appoint managers to act as Bronze on-call manager to lead the response to an incident.

The *Contractor* shall establish an on-call rota to cover working and out-of-hours and include the contact details on the Incident Response Arrangements Form and submit it to the *Project Manager* for acceptance prior to start of work. The format for the Incident Response Arrangements Form is at Appendix 8A. The *Contractor* shall ensure that the on-call rota and Incident Response Arrangements Form is up-to-date at all times and updated versions of the Incident Response Arrangements Form are submitted to the *Project Manager* immediately. The *Contractor* shall formally notify the Incident Response Desk at least monthly (including confirming where there has been no change to the details) and immediately upon any changes being made or planned to be made.

The *Contractor's* on-call person(s) shall be available on the phone throughout the on-call period so as to be able to deal with any incident at any time, shall be contacted first, and shall notify the relevant *Contractor's* personnel. The on-call person shall not leave the UK during their on-call period and shall not normally be on leave (except public holidays). They should not put themselves in a place where they would be unable to take a call except for short periods of time (for example when using the Underground). They shall be able to attend Site or working area if required, have the means to do so, and be compliant with *The Employer's* drug and alcohol Policy.

8.5.5 The *Employer's* Rivo Safeguard Incident Management System

In addition to its' statutory duty to report incidents to the enforcing authorities, the *Contractor* shall report to the *Project Manager* all incidents arising from the works using the *Employer's* Rivo Safeguard Incident Management System.

The *Employer's* Rivo Safeguard Incident Management System sends automatic email notifications to nominated personnel to notify them that an incident has occurred. The *Contractor* shall nominate users of the *Employer's* Rivo Safeguard Incident Management System and nominate personnel to whom automatic email notifications need to be sent and submit their names and email addresses to the *Project Manager*. The *Contractor* shall ensure that these users attend the *Employer's* Rivo Safeguard Incident Management System training.

8.5.6 Training and information

The *Contractor* shall:

- Train all personnel in incident management according to their particular roles and responsibilities.
- Ensure that incident response arrangements, including contact numbers are posted on Site noticeboards and available with security personnel at all times.
- Make records of such training available to the *Employer / Project Manager* on request.

- Provide refresher training on an annual basis to active participants of the Incident Plan.

8.5.7 Testing

The *Contractor* shall conduct regular exercises to test the effectiveness of its incident management processes and implement improvements where the test highlights the need. Testing shall include all types of incidents with planning exercises, including but not limited to, desk top exercises and simulation of incidents, and involve the emergency services, operational rail interfaces and other key stakeholders in the planning exercises. Testing shall occur at least once in each 6 month period and before major activities such as rail possessions, start of significant new major activities and any significant extension of the Site to or Working Areas.

8.6 Incident Response

8.6.1 Incident Response

In implementing the response to an incident, the *Contractor* shall bring the incident under control including stopping works where necessary, preventing and minimising harm or damage and accounting for all personnel on Site and working areas at the time and contacting the emergency services if required.

Should a third party (for example the emergency services) take over the management of an incident from the *Contractor*, the *Contractor* shall notify the Incident Response Desk.

The *Contractor* shall gather evidence as soon as the incident has been brought under control, to ensure that sufficient information is available to enable a full and thorough investigation.

The *Contractor* shall resume interrupted activities only once if it is safe to do so, the incident has been brought under control, and evidence has been gathered.

8.6.2 Media Liaison

The *Contractor* shall not release any information to the media without the prior written permission of the *Employer*. Should the *Contractor* receive an enquiry from the media, the *Contractor* shall immediately pass the enquiry to the *Employer's Helpdesk and Project Manager*.

8.6.3 Incident Notification

In the event of a Level 1, 2 or 3 incident the *Contractor* (Bronze) shall telephone the Incident Response Desk (0203 197 5000) within the following timescales:

Level 1 – immediately by telephone;

Level 2 – immediately by telephone;

Level 3 – within 24 hours of the incident by telephone.

Level 4 incidents do not need to be notified to the Incident Response Desk

The *Contractor* shall agree the frequency of updates to be provided by the *Contractor* to the Incident Response Desk until such a time as the Silver on-call manager or *Project Manager* has made contact with the *Contractor*. When reporting the incident, the Incident Response Desk will provide the *Contractor* with a unique reference number with

which to input information in to the *Employer's* Rivo Safeguard Incident Management System.

The Silver on-call manager will contact the *Contractor*, using the contact details provided on the Incident Response Arrangements Form, to determine if the incident details are fully understood, review action that has already been taken and further action that is proposed, gather information on the scale of the incident including existing or potential harm or damage, and establish whether the Silver on-call manager needs to offer any support. The *Contractor* shall stop work if instructed by the Silver on-call manager. The Silver on-call manager shall agree with the *Contractor* if any further liaison is needed and if so, how it shall take place (for example provision of situation reports from the *Contractor* to the Silver on-call manager).

Only in the event that the Incident Response Desk cannot be contacted by the *Contractor* (Bronze), the *Contractor* (Bronze) shall telephone the Project Helpdesk (0345 602 3813).

The *Contractor* (Bronze) shall immediately inform the Silver on-call manager if an enforcing authority has attended an incident, been notified of an incident or is otherwise involved in an incident.

The *Contractor* (Bronze) shall log all Level 1, 2, 3 and 4 incidents into the *Employer's* Rivo Safeguard Incident Management System within the following timescales:

Level 1 – by 11am on the next working day after the incident

Level 2 – by 11am on the next working day after the incident

Level 3 – during the next working day after the incident

Level 4 – within 3 working days after the incident.

The *Contractor* shall notify the relevant enforcing authority of any incidents that require notification under the Environmental Damage (Prevention and Remediation) Regulations and any other environmental legislation.

8.7 Incident Investigation

As soon as the incident has been stopped or brought under control, the *Contractor* shall undertake a full and thorough investigation to identify lessons learnt to help prevent recurrence.

For Level 1 and Level 2 incidents, a terms of reference for the investigation shall be submitted to the *Project Manager* for review.

The investigation shall be documented in an incident investigation report, which shall be inputted to and uploaded into the *Employer's* Safeguard Incident Management System (Rivo) within 10 days of the incident occurring, including actions inputted into the action tracker within the *Employer's* Rivo Safeguard Incident Management System.

The *Contractor* shall also include the required information in the incident investigation form in the *Employer's* Rivo Safeguard Incident Management System.

If during an investigation, it transpires that an incident has been categorised at the wrong level, the *Contractor* shall advise the *Project Manager* who will update the level if in agreement.

On completion of actions, the *Contractor* shall input details of corrective and preventative actions taken into the *Employer's* Rivo Safeguard Incident Management System. The *Contractor* shall close actions and incidents in the database for Level 3 and 4 incidents – the *Contractor* shall only close level 3 and 4 incidents once all the actions have been completed.

The *Contractor* shall co-operate with the *Project Manager* and the *Employer* in incident investigation and follow-up of incidents to identify root causes and lessons learned. This shall include providing access to contract information, evidence materials, documentation, the Site and working areas and staff as part of any investigation that the *Project Manager* and/or the *Employer* may independently undertake.

8.8 Incident Review

The *Contractor* shall review incidents regularly to ensure investigations and corrective and preventive actions have been completed on time, identify trends and strategic actions to be implemented to disseminate lessons learnt and prevent recurrence.

8.9 Appendix:

8A - Incident Response Arrangements Form (IRAF).

Part 9 – Community Relations

9.1 Introduction

Community relations and publicity on the Project is the joint responsibility of the *Employer*, the *Project Manager* and the *Contractor*. The Works Information sets out the *Employer's* minimum requirements for compliance with the Project policies and procedures relating to community relations and publicity.

The *Employer's* community relations and publicity activities are discharged by the *Employer's* Community Relations Team under the direction of the following functional managers:

- the *Employer's* Head of External Affairs for any matters relating to contact with the media and liaison with parliamentarians and members of the London Assembly;
- the *Employer's* Head of Stakeholder Engagement for any matters relating to the operation of the Public Helpdesk (Helpline) and inclusivity and/or the *Employer's* community relations policy matters; and
- the *Employer's* Area Community Relations Managers for all contacts with local residents groups, schools, parish councils and local authorities.

The *Project Manager* will notify the *Contractor* of the names and contact details of the *Employer's* Community Relations Team.

Any queries regarding Community Relations must be referred to the *Project Manager*. All contact with the media shall be handled by the *Employer* except with the written consent of the *Project Manager*. All telephone calls or letters from third parties received must immediately be referred to the *Project Manager* and to the *Employer's* press desk in the case of media enquiries.

9.2 *Contractor's* Community Relations Responsibilities

The *Employer* has developed a Construction Community Relations Strategy Framework in order to engage with the multiple stakeholders on the Project. The *Contractor* shall:

- ensure the *Contractor's* Community Relations Representative (and nominated delegate) is fully conversant with local demographics and culture and briefs Site staff on issues of note;
- ensure that all subcontractors and suppliers of any tier comply with all community relations legal and contract requirements, where relevant to the works;

- develop, implement, maintain and update as required a Community Liaison Plan (see 9.4 below);
- produce Information Sheets (see 9.6 below);
- produce other information bulletins and materials as appropriate, including material for periodical community information bulletins;
- cooperate with the *Project Manager*, the *Employer* and Others when liaising with property owners as required in support of meeting the requirements of this contract;
- participate in the *Employer's* education programme, in particular a proactive programme of local site safety initiatives;
- include key community relations information such as local demographics and sensitivities and provision of equality/diversity training for contracts with significant equality impacts as part of the *Contractor's* mandatory site induction;
- participate and comply with the Small Claims Scheme;
- abide by the *Employer's* complaints handling procedures;
- cooperate with the *Employer* in other activities as requested or instructed by the *Project Manager*, including (without limitation) assistance with community liaison panels, (including hosting sub-group meetings where appropriate), attending meetings with local authorities, participating in community activities (such as attendance at community events) and providing information and support resources for visitor information centres;
- demonstrate engagement as appropriate with residents of ethnic minority backgrounds, women's organisations, residents with disabilities (and/or their representatives), faith groups and lesbian, gay, bisexual and transgendered groups who may be differently affected by construction impacts, reporting such activity to the *Employer*;
- register the Site and any Working Areas with the Considerate Constructors Scheme (the Scheme) and comply with the Scheme's Code.

9.3 Community Relations Representation

The *Contractor* shall appoint a Community Relations Representative and shall also employ such additional community relations resources as may be necessary to deliver its responsibilities under this part of the Works Information.

The Community Relations Representative shall:

- be contactable 24 hours a day, 7 days a week (with a delegate/s nominated during periods of authorised leave who shall be fully capable of delivering the *Contractor's* community relations responsibilities);

- engage with the community to provide appropriate information and be the first line of response to resolve issues of concern;
- cooperate with the *Project Manager* and the *Employer* in all matters relating to community relations and publicity policy;
- cooperate with the *Employer* for communicating to the public how training and employment opportunities will be available;
- implement the *Contractor's* Community Liaison Plan and Community Investment Programme;
- manage and resolve complaints or enquiries directed to the *Contractor* from the Crossrail Public Helpdesk or *Project Manager*, initiate any necessary enforcement or corrective action on behalf of the *Contractor*, respond to the complainant within 24 hours, and advise the Crossrail Public Helpdesk of the outcome of action taken within 24 hours;
- ensure the Crossrail Public Helpdesk is supplied with the current 7 day, 24 hour duty roster for the Community Relations Representative and nominated representatives for the coming week and
- provide, for monitoring purposes, a weekly activity summary and three-month look-ahead report to the *Project Manager* for inclusion in the weekly Helpdesk report (which must specify all complaints received) and Project Community Relations 3-month look-ahead report (the look-ahead report shall include information about forthcoming works especially those that will or may have an impact on the local community, eg implementation of a new traffic management system or removal of excavated material)

The Community Relations Representative and nominated delegates shall:

- have sufficient authority to determine and initiate action on Site should it be necessary;
- possess sufficient knowledge of the *works* and Site operations to be able to respond to complaints and enquiries in an informative way; and
- be able to deal with public complaints in a sensitive manner.

9.4 Community Liaison Plan

Within 4 weeks of the *starting date*, the *Contractor* shall produce a Community Liaison Plan in the format included in Appendix 9B and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Community Liaison Plan the *Project Manager* replies within 4 weeks of the date of submission.

Any further revisions, submissions and responses shall be made within the *period for reply*.

The accepted Community Liaison Plan shall be issued to the local authorities by the *Employer* 4 weeks in advance of the *works* commencing on site.

The Community Liaison Plan shall:

- give the *Contractor's* name, site address and key contacts including the location, telephone (fixed and mobile) and fax numbers and email for the Community Relations Representative both during and outside normal working hours;
- detail the overall method for producing advance notification information;
- identify key contract details (such as scope of work, properties likely to be affected by the *works* either directly or indirectly);
- provide expected durations of phases or work, their potential impact on the local community and mitigation measures;
- identify all relevant emergency contact details;
- give details of known equality impacts (locations of schools, places of worship, elderly accommodation etc);
- demonstrate how the *Contractor* will disseminate information in an inclusive manner with specific ethnic groups, representatives of and for disabled people and gender based organisations, considering the languages spoken by the various communities affected by the *works* and the needs of people who may have a sensory impairment or learning disability when producing communication material;
- demonstrate how the access rights of disabled people will also be satisfied;
- specify details of the catchment area (as a minimum all properties within 100 metres of the *works*) to be included in Information Sheet deliveries and list other recipients of Information Sheets (e.g. ward councillors, parish councils, residents' groups, information boards at community centres, libraries and post offices, citizens advice bureau, police stations etc.);
- provide the Crossrail Public Helpdesk number;
- provide details of any expected public transport diversions, delays, planned road closures, impacts on highways, interrupted access for residents/businesses, or other expected community disruption;
- include the contact details of the independent Crossrail Complaints Commissioner;
- give contact details of local authority officers responsible for monitoring environmental and planning matters;

- give details of how the *Contractor* will address feedback from local communities in relation to its performance of the *works*;
- provide contact details of any industry partners' key site personnel (for example Network Rail, London Underground, Docklands Light Railway, Transport for London) where appropriate; and

The *Contractor* shall review and update the Community Liaison Plan as instructed by the *Project Manager* as the *works* progress (particularly when the nature of the impacts increase) to ensure it reflects the current site conditions, reasonable advice from local authorities and provides up to date contact information. Revised plans shall be submitted to the *Project Manager* for acceptance and upon acceptance forwarded to the local authorities by the *Employer*.

9.5 Community Investment

The *Employer* is committed to ensuring the Project provides benefits to the local community through its investment and the regeneration opportunities that arise from its construction. The *Employer* also requires that as part of the wider benefits of the contract to the local community, the *Contractor* will optimise, wherever possible, any opportunities to bring benefits to the local community in addition to the benefits delivered as a result of the Responsible Procurement obligations in this Works Information..

Although the cost of such investment to the *Contractor* is not to be construed as forming part of the Defined Cost of the *works*, the *Employer* is keen to ensure that the *Contractor's* investment in the local community is coordinated, managed and diverse and contributes to a lasting legacy.

The *Contractor* shall develop a plan for such community investment and submit it to the *Project Manager* for acceptance. The *Contractor* shall invite local community stakeholders to suggest initiatives for inclusion in the Community Investment Plan.

The *Contractor* shall produce the Community Investment Plan no later than 13 weeks after the *starting date* and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Community Investment Plan the *Project Manager* replies within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*, and shall be in accordance with a programme of submissions to be defined in the Community Investment Plan.

The *Contractor's* Community Investment Plan shall:

- Identify and focus on appropriate investment that has the greatest impact on the local community based on the following criteria:
 - project impact;
 - value to community, value to the Project and sustainability;

- availability of resources (internal and external);
 - political and/or cultural sensitivities;
 - achievability and measurability; and
 - duration and cost;
- encourage local community members to increase their personal and institutional capacities to mobilise and manage resources to produce sustainable and justly distributed improvements in their quality of life, consistent with their own aspirations that survive beyond completion of the Contract;
 - consider the needs of the local community as a whole in an inclusive and equal manner;
 - allow for consultation with the *Project Manager* and *Employer* to ensure that historical community knowledge informs the investment plan and there is a consistent approach across the Project;
 - avoid creating dependencies where the local community becomes reliant on others to fulfil their needs;
 - avoid reactive investments with short-term impact that whilst being legitimate and worthy are not sustainable in the longer term; and
 - develop a clear mechanism for selection using the scoring criteria included in Appendix 9C to assess the likely success of the plan and the template included in Appendix 9D for submission of plan particulars to the *Project Manager* (an example is provide in Appendix 9D).

9.6 Advance Notification of the Works

Where the *Contractor* is the Principal Contractor they will notify occupiers of properties affected by the *works* in advance of activities commencing in any given location as follows:-

The *Contractor* shall produce Information Sheets and submit them to the *Project Manager* for acceptance at least 4 weeks prior to commencement of the site activities.

The *Contractor* shall produce and distribute accepted Information Sheets to local residents and businesses as identified in the Community Liaison Plan at least 2 weeks prior to the site activities commencing.

The Information Sheets shall be printed by the *Contractor* onto standard Crossrail Public Information A4 templates, with translation boxes, in the format included in Appendix 9E. As well as the requirement to print translation boxes, a toolkit to enable information to be communicated in accordance with the *Employer's* inclusivity commitments shall be given to the *Contractor* by the *Project Manager*.

The *Contractor* shall produce an electronic copy of each Information Sheet. The *Contractor* shall ensure that each Information Sheet is supplied to the *Employer* in a form suitable to be published on the *Employer's* website at the same time as printed information sheets are hand delivered.

In the event that there are fewer than 4 weeks between the *starting date* and commencement of activities, information shall be provided as soon as practicable and with regard to the requirement to distribute Information Sheets at least 2 weeks prior to the site activities commencing..

Any activities which are likely to have an impact on the local community beyond that of normal working (e.g. delivery of large plant, weekend working for specific activities, road closures etc.), or any changes to the duration of the activities from that supplied in Information Sheets prior to the start of the commencement of site activities, will require the *Contractor* to produce additional Information Sheets, detailing the location, nature and expected duration, expected disruptions and the measures being taken to minimise or mitigate adverse impacts of these additional activities.

The *Contractor* shall ensure that where the *Employer* has given specific undertakings or assurances to provide information to the community in advance of specific work activities (for example 2 weeks notice of the passage of tunnel boring machines under properties) that these legal duties are complied with.

The *Contractor* shall:

- submit these additional Information Sheets to the *Project Manager* for acceptance 4 weeks prior to the related works commencing or in the case of emergency works or overruns, immediately after the *Contractor* is aware that these works need to take place; and
- produce and distribute accepted Information Sheets to local residents and businesses likely to be affected at least 2 weeks prior to the construction activity taking place, or in the case of emergency works or overruns, immediately after the *Contractor* is aware that these works need to take place.

The *Contractor* shall ensure the distribution of Information Sheets to the area specified in the Community Liaison Plan. It is noted that this will be the subject of performance and quality measurement and audit by the *Project Manager*.

9.7 Not Used

9.8 Not Used

9.9 Complaints & Enquiries

9.9.1 Crossrail Public Helpdesk

The *Employer* will operate the Crossrail Public Helpdesk 24 hours per day 7 days per week for the duration of the Contract to manage all complaints and enquiries

from the public. The Crossrail Public Helpdesk provides a single point of contact through the Crossrail Public Helpdesk number. The *Contractor's* own helplines should not be publicised in relation to this Contract.

9.9.2 Enquiries and Complaints Received by the *Contractor*

The *Contractor* shall develop and implement a procedure for receiving and responding to complaints which shall include: a description of roles and responsibilities; investigation of complaints; response times and method of response; and of recording corrective and preventive actions taken. The *Contractor* shall submit the complaints procedure to the *Project Manager* for acceptance prior to the start of work.

The *Contractor* shall log and notify all enquiries and complaints received from the public or any other organisation or authority to the Crossrail Public Helpdesk and the *Project Manager*. The *Project Manager* shall specify the format in which logs are to be made.

The *Employer* will operate a complaints monitoring system to record and track complaints received.

The *Contractor* shall respond promptly to complaints or other enquiries notified via the Crossrail Public Helpdesk.

9.9.3 Crossrail Complaints Commissioner

An independent Crossrail Complaints Commissioner has been appointed for the Programme by the Secretary of State. The remit of the Crossrail Complaints Commissioner is to impartially and fairly investigate any case where it is alleged that the *Employer* (the Nominated Undertaker under the Crossrail Act 2008) has not satisfactorily addressed a matter raised by a complainant. This role will also include:

- acting as a mediator in unresolved disputes between the Project and members of the public;
- making recommendations to the *Employer* (Nominated Undertaker) where action might be taken to satisfactorily address complaints, resolve disputes, or mitigate against the future occurrence of complaints or disputes;
- being Registrar of the Small Claims Scheme and mediating in the event that a claim for loss or damages has been turned down by the Administrator of the Small Claims Scheme and the applicant disputes the decision (the Crossrail Complaints Commissioner can make financial recommendations if the applicant has suffered a loss or damages of up to £5000); and
- advising members of the public who are unhappy with any aspect of the construction of Crossrail Programme on who to complain to.

The *Contractor* shall provide information as requested by the *Project Manager* for the Crossrail Complaints Commissioner.

9.10 Small Claims Scheme

The *Employer* operates a Small Claims Scheme, the purpose of which is to provide for the prompt and convenient resolution of minor claims for physical damage to property up to a maximum value of £5,000 for any one occurrence, arising from the construction of the *works*. The scheme is available to householders, farmers, commercial and other organisations having an interest in land or property but not to local authorities and government departments or agencies. The *Employer* has appointed a Small Claims Scheme administrator (whose identity will be notified to the *Contractor* from time to time) who shall be responsible for administering the scheme, investigating any potential claims notified and deciding whether any resulting claims are warranted. The Small Claims Scheme does not affect a property owner's statutory rights and property owners are not obliged to use the scheme.

The *Contractor* shall provide a point of contact for the Small Claims Scheme who shall assist in enabling claims to be progressed promptly in liaison with the *Project Manager* and the *Employer*.

The Crossrail Public Helpdesk shall be the focal point for claimants under the scheme. This *Employer's* main loss adjusters who will decide whether any claim falls within the Small Claims Scheme and should therefore be passed to the Small Claims Scheme administrator for resolution.

If the *Contractor* receives a claim, or becomes aware of an incident likely to give rise to a claim under the scheme, he must immediately notify full details to the Crossrail Public Helpdesk. The *Contractor* co-operates in obtaining and providing any information required in connection with any claim.

Where the Small Claims Scheme administrator considers that a claimant is entitled to compensation in respect of a qualifying claim he shall assess the amount of compensation and, subject to the claimant agreeing to settle the claim for that amount, shall arrange for payment to be made to the claimant.

If the claimant is dissatisfied with the Small Claims Scheme administrator's assessment he may write to the Crossrail Complaints Commissioner requesting the Crossrail Complaints Commissioner to mediate in the matter. If the Complaints Commissioner is unable to resolve the claim to the satisfaction of the claimant, then the claimant may request that the claim is submitted for expert determination under the dispute resolution service of the Royal Institute of Chartered Surveyors.

Where a claim arises as the result of an event which is at the *Contractor's* risk under the contract, amounts paid to the claimant, whether determined by the small claims administrator the Crossrail Complaints Commissioner or an expert appointed under the dispute resolution service of the Royal Institute of Chartered Surveyors, will be retained from the *Contractor* in accordance with the conditions of contract.

9.11 Publicity

The *Contractor* shall not, except with the consent of the *Employer*

- make any comment to the press regarding the *works*, give interviews, allow interviews to be given, or take part in programmes relating to the *works*;
- issue press releases or other text, artists' impressions, filmed images, drawings, plans, CAD Data, photographs or similar relating to the *works* to the media;
- issue publicity material or exhibit any text, artists impressions, filmed images, drawings, plans CAD Data, photographs or similar relating to the *works*;
- publish any communications, including internet communications, relating to the *works*;
- use site hoardings or notices, or allow them to be used, for the purposes of advertising; or
- use images or text relating to the *works* for advertising/publicity purposes.

The *Contractor* shall manage the display of information on site hoarding. The *Contractor* shall:

- carry out any amendment to the information displayed as soon as practicable after receipt of notification of the amendment from the the *Project Manager*, and in any event not later than one week after receipt;
- display a plain English description of any Section 61 applications and any dispensations that have been approved by the local authority, including working hours, activities, noise control measures in place and a look-ahead of forthcoming works; and update this information at least monthly; and

The *Contractor* shall cooperate with the *Employer* and the *Project Manager* in media events, publications, film or photography shoots and press visits to the Site.

When requested by the *Project Manager* for information to respond to a media enquiry, the *Contractor* must supply the information requested within 1 hour of the request.

9.12 Appendices

Appendix 9B	Community Liaison Plan Template
Appendix 9C	Community Investment Programme Example Criteria
Appendix 9D	Community Investment Programme Template & Example
Appendix 9E	Crossrail Public Information Template

Part 10 – Network Rail Interface

10.1 Introduction

This part of the Works Information applies to any part of the *works* constituting the Relevant Works.

Network Rail, as the controller of the Network has: -

- a duty to provide and maintain a safe railway; and
- through its agreements with the various train operating and freight operating companies using the Network, a duty to protect the rights of these companies and to maintain a level of service to their customers.

The Project interfaces with the Network at various locations along its route and consequently its construction will impact upon the Network with the potential for disruption to Network Rail and to the services provided by the various operating companies using it.

The *Employer*, during the construction of the Programme, is committed to ensuring the continued safe operation of the Network Rail Network and to minimising any disruption to Network Rail's and the operating companies' services.

To this end, the *Employer* and Network Rail have entered into a Framework Asset Protection Agreement (the "Framework APA") to facilitate the undertaking of those parts of the *works* located over, under, alongside or on the Railway which Network Rail determines might reasonably affect the safety and operation of the Railway (the "Relevant Works"). The Framework APA defines the processes to be followed for works that have the potential to affect existing Network Rail assets, for example through ground movement caused by construction activities.

The Relevant Works already identified by the *Employer* are stated in Schedule 9 of the Specification for the Control of Ground Movement (C122-OVE-C2-RSP-CR001-00001) in Volume 2C of the Works Information.

The *Contractor* shall not carry out any Relevant Works Package without the *Project Manager* having notified the *Contractor* that Network Rail approval to such work has been obtained.

10.2 Technical and Defined Terms

Technical and defined terms used in this part of the Works Information shall have the meaning given in the Glossary

10.3 The Relevant Works

The Relevant Works already identified by the *Employer* are stated in Schedule 9 of the Specification for the Control of Ground Movement (C122-OVE-C2-RSP-CR001-00001).

The Relevant Works identified by the *Employer* may not be exhaustive of all the Relevant Works required to Provide the Works. Depending on how the *Contractor* plans to construct the *works* and in particular the nature and extent of any temporary works he may elect to use, there may be other parts of the *works* that have the potential to affect the stability, safety, maintenance or operation of the Network and therefore constitute Relevant Works.

Within 6 weeks of the *starting date*, the *Contractor* shall notify the *Project Manager* of any parts of the *works* which he considers may constitute Relevant Works but which have not been identified in Volume 2A of the Works Information. The *Contractor's* notification shall include an explanation, supported if necessary by drawings and other relevant information, as to why the part of the *works* notified may constitute Relevant Works.

Upon receipt of the *Contractor's* notification, the *Project Manager* shall review and submit the above information to Network Rail to enable them to determine whether such works are Relevant Works.

The *Project Manager* shall communicate Network Rail's decision to the *Contractor*. If Network Rail confirms that the part of the *works* is Relevant Works then the requirements of this part of the Works Information shall apply to that part of the *works*.

10.4 The *Employer's* Responsibilities for the Network Rail Interface

10.4.1 The Framework APA

The Framework APA imposes a duty to co-operate on the *Employer* and Network Rail, in the planning and development of each Relevant Works Package Schedule including the utilisation of NR Possessions to facilitate both the safe and efficient operation of the Relevant Works and the safe and efficient operation of the Network.

The *Contractor* will not be permitted to carry out any Relevant Works Package without the *Project Manager* first having obtained Network Rail's approval. It will be necessary for the *Project Manager* to apply to Network Rail for various approvals (the "Network Rail Consents") before carrying out any Relevant Works Package.

10.4.2 Network Rail Industry Partner Manager

In order to facilitate and co-ordinate the work of the *Employer* across the whole of the Project and maintain a consistent approach to the Network Rail interface, the *Project Manager*, acting on behalf of the *Employer*, will, coordinate and manage the strategic aspects of the Relevant Works.

The *Contractor* shall be responsible for the timely provision of all necessary information and consulting and liaising with the *Project Manager* at all stages during the preparation

of the information required to support the *Project Manager's* technical submissions and applications to Network Rail for NR Possessions.

The *Project Manager* shall:

- Obtain responses and act as the *Contractor's* focal point for any Network Rail or Relevant Works-related queries;
- facilitate direct communication where appropriate between the *Contractor* and Network Rail and subject to such requirements as may be directed to enable the *Project Manager* to retain full visibility of such communications;
- review the information prepared by the *Contractor* in support of the *Project Manager's* technical submissions and NR Possession arrangements for completeness and clarity ;
- routine monitoring of the *Contractor's* progress with the preparation of the information required in support of technical submissions and NR Possession arrangements;
- routinely monitor the *Contractor's* co-ordination with the work of Others insofar as it relates to the Network Rail interface; and
- issue instructions relating to the Relevant Works and all requirements of Network Rail.

The *Project Manager* in consultation with the *Contractor* shall liaise with Network Rail on a regular basis and shall maintain an up to date Relevant Works Package Schedule for each Relevant Works Package.

For the avoidance of doubt, the appointment of the *Project Manager* to provide co-ordination with Network Rail does not diminish the *Contractor's* responsibility to provide any information required by the *Project Manager* in support of technical submissions and/or NR Possession applications.

10.5 The *Contractor's* Main Responsibilities

10.5.1 General

At a time to be agreed between the *Project Manager* and the *Contractor*, having due regard to the commencement date of each Relevant Works Package, the *Project Manager* in consultation with the *Contractor* shall prepare for each Relevant Works Package a Relevant Works Package Schedule for submission to Network Rail for agreement in principle.

The Relevant Works Package Schedule shall include the proposed dates for:

- The submission of the Design Data for approval and its approval;

- The submission of method statements and work package plans and their approval;
- The submission of an initial proposed NR Possession Plan;
- The undertaking of any survey works;
- The production and agreement of works inspection and testing plans;
- In respect of Network Rail Property Works only, the production and agreement of taking into use (by Network Rail) and commissioning plans; and
- All critical path activities in connection with the Relevant Works Package.

Network Rail and the *Project Manager* shall jointly review the agreed Relevant Works Package Schedules from time to time and shall agree what, if any, action needs to be taken in order to achieve the agreed dates for NR Possessions and the completion of the Relevant Works Packages or any part thereof. If in the reasonable opinion of Network Rail the actual progress of the Relevant Works Packages or any part thereof does not conform to the agreed Relevant Works Package Schedule or the booked NR Possessions dates for the relevant part of the Relevant Works Package are unlikely to be achieved, the *Contractor* in consultation with the *Project Manager* shall produce a revised schedule (subject to the agreement of Network Rail where the revisions are material) in order to achieve the agreed NR Possession dates and to ensure Completion of the Relevant Works Package or the relevant part thereof.

For each Relevant Works Package, the *Contractor* shall prepare by the dates set out in the Relevant Works Package Schedule (or any revisions to it that have been agreed with the *Project Manager*) any documentation required to enable the *Employer* to make submissions for the Network Rail Consents and when necessary modify the design or construction processes to enable the *Employer* to ensure that such consent is obtained and provide the *Project Manager* with a copy of all such documents so prepared.

If there shall be a Variation to a Relevant Works Package after the issue of the detailed design acceptance relating thereto, the *Contractor* shall not carry out the Relevant Works Package until the required Network Rail Consents have been obtained.

10.5.2 Carrying Out The Relevant Works Package

10.5.2.1 General

Before any of the Relevant Works may proceed, the *Employer* needs to satisfy Network Rail that each Relevant Works Package shall be carried out in such a manner that:

- the safe operation of the Network is ensured at all times;
- in the case of Network Rail Property Works, the works shall be technically adequate for their purpose; and

- any disruption to the Network or to the TOCs or FOCs is, as far as possible, planned well in advance and is the necessary minimum reasonably required to provide the Relevant Works Package.

Continuous liaison between the *Employer* and Network Rail together with a process of formal technical submissions are the means by which the *Employer* is required to satisfy Network Rail that the above objectives will be achieved.

Consistent with obtaining Network Rail's agreement to the commencement of a Relevant Works Package, the *Contractor's* main responsibilities are as follows:

- to appoint a Network Rail Interface Manager who shall be responsible for the management, co-ordination, delivery and control of the *Contractor's* activities relating to the Network Rail interface;
- to notify the *Project Manager* of all consents and approvals required in respect of the Relevant Works identifying when such consents are likely to be required;
- to ascertain and provide all information in support of technical submissions and NR Possession applications;
- to ascertain when all such submissions and applications need to be submitted to allow sufficient time for review by Network Rail and, if appropriate, revise and re-submit;
- to show on all programmes submitted to the *Project Manager* for acceptance the order and timing of all activities in connection with the submissions and applications necessary to obtain the Necessary Consents;
- to seek preliminary guidance from Network Rail, where appropriate, regarding the form, content and timing of all submissions and applications and of any constraints which may impact upon the Relevant Works;
- to seek to reach provisional agreement with Network Rail and the *Project Manager* of all significant matters prior to formal submissions and applications;
- to provide to the *Project Manager* a Safe Management Plan;
- to design (to the extent that the *Contractor* is responsible for the design of the Relevant Works), procure and carry out each Relevant Works Package in accordance with:
 - all Legal Requirements;
 - all relevant Standards;
 - all other relevant current British, European and international codes and standards;
 - the Network Rail Requirements;

- all Necessary Consents and so as not to prejudice the renewal of any such Necessary Consents;
 - the requirements of the Network Rail Consents and any other consents, permissions, orders and agreements obtained in respect of the Relevant Works;
 - the Works Requirements; and
 - the Safe Management Plan;
 - such other conditions as Network Rail may reasonably consider necessary to prevent, address, alleviate or comply with (as applicable) a network Operation Issue; and
 - such other conditions as network Rail may reasonably consider necessary relating to the efficiency and safety of the Railway.
- to design (to the extent that the *Contractor* is responsible for the design of the Relevant Works) such as to enable construction of the Relevant Works and the maintenance and repair of the Relevant Works in a manner which minimises disruption to the Railway;
 - at the *Project Manager's* request, to attend meetings with the *Project Manager*, the *Employer* or Network Rail during the design and/or construction of the Relevant Works;
 - to provide to the *Project Manager* any assistance and information which the *Employer* requires to comply with the procedures for arranging and implementing NR Possessions;
 - to provide to the *Project Manager* any assistance and information, including all Design Data, which the *Employer* requires to satisfy Network Rail that during the construction of each Relevant Works Package the continued safe operation of the Network is ensured at all times. This information will include work package plans and method statements. Method statements shall include a comprehensive step-by-step account of how the Relevant Works Package will be executed and shall cover the topics included in Appendix 10D;
 - to provide the *Project Manager* with any other information stated in this part of the Works Information to enable the *Employer* to comply with his obligations under the Framework APA, in particular the obtaining of the Network Rail Consents set out in Appendix 10A to this part of the Works Information;
 - to take all steps to ensure that the Relevant Works are carried out to minimise disruption to the Railway and any third party using or with an interest in or a right over any part of the Railway or any other land and buildings affected by the Relevant Works;

- carry out the Relevant Works with all reasonable dispatch at all times and in such a way as to minimise insofar as is reasonably practicable any interference with the rail traffic operating on the Network;
- carry out the Relevant Works to the satisfaction of Network Rail in respect of the protection, safety and efficient operation of the Railway and the safety of persons on or near the Railway;
- carry out the Relevant Works in accordance with the specifications set out in the Works Information and the requirements of any Necessary Consents obtained in respect of the Relevant Works; and
- notify the *Project Manager* so notice can be given to Network Rail when the *Contractor* believes it has completed the Relevant Works in accordance with this contract.

Before any Relevant Works Package can be commenced the *Employer* is required to obtain Network Rail's prior written agreement to the Relevant Works Package Schedule, work package plans and method statements for the carrying out and completion of the Relevant Works Package and the movement of Plant and Materials and Equipment near the Railway and which may affect the Railway.

The *Contractor* shall not commence the construction of any Relevant Works Package prior to the Works Commencement Date. The Works Commencement Date in respect of any Relevant Works Package is the latest of:

- the date upon which all Necessary Consents (which must include detailed design approval) have been obtained or agreed by Network Rail which are necessary to commence the carrying out of the Relevant Works Package;
- the date of completion of the relevant preliminary works required to be carried out by the *Contractor* in accordance with this part of the Works Information; and
- the date of agreement of the Safe Management Plan.

If the *Project Manager* notifies the *Contractor* that the whole or part of the Relevant Works Package fails to comply with the Network Rail Requirements or any relevant Standards the *Contractor* shall provide a rectification plan to the *Project Manager* within three working days or such other timescale as shall be agreed and shall carry out such remedial work of construction or design in accordance with the approved rectification plan as may be required so that the Relevant Works do so comply.

The *Project Manager* may require the *Contractor* to carry out any demonstrations or tests for any relevant part of the Relevant Works to the extent that it affects the stability, maintenance, safety and operation of the Railway.

During the construction of the Relevant Works Package, if Network Rail so requires and the *Project Manager* so instructs, or on completion of the Relevant Works Package and any subsequent repair or remedy of the Relevant Works Package, the *Contractor* shall make good any property of Network Rail which may have been damaged or interfered

with and shall remove all surplus material brought on to Network Rail's land by the *Contractor*.

The *Contractor* shall exchange information and otherwise co-operate with the *Project Manager* so far as it is necessary to enable Network Rail to review or revise its safety regime (as may be appropriate) relating to the maintenance, repair, improvement, alteration and operation of the Railway during the construction of the Relevant Works and for a period of 12 months thereafter.

10.5.3 Network Rail Possessions

10.5.3.1 General

NR Possessions may be required to carry out parts of the *works* including surveys, the construction of certain Relevant Works Packages and to monitor the effects of the Relevant Works on the Network.

Any NR Possession constitutes disruption to the Network and consequently their use is to be avoided unless absolutely necessary to Provide the Works. If the need for NR Possessions cannot be avoided then they shall only be carried out on dates and times agreed with Network Rail.

If a NR Possession of the Network is required in order to carry out a Relevant Works Package the *Project Manager* with the assistance of the *Contractor* shall consult with Network Rail regarding the availability of NR Possessions.

Where the use of NR Possessions is unavoidable, the *Contractor* shall follow the Network Rail Possession planning process to ensure that NR Possessions are available when required and that such use is planned well in advance to minimise the disruption caused to the Network and the services provided by TOCs and FOCs.

The *Contractor* must develop and submit to the *Project Manager* a NR Possession Plan that identifies those NR Possessions which the *Contractor* considers are necessary in order to Provide the Works in accordance with his programme.

For the avoidance of doubt the NR Possession Plan will form part of the Works Information and consequently:

- the NR Possessions identified within the contract Possession Plan represent a constraint on how the *Contractor* Provides the Works;
- the *Contractor* shall Provide the Works in accordance with the NR Possession Plan; and
- no information contained within the NR Possession Plan may be changed other than by an instruction given by the *Project Manager*.

The *Contractor* shall show on all programmes submitted to the *Project Manager* for acceptance in accordance with the *conditions of contract*, the order and timing of any NR Possessions he plans to use to Provide the Works.

The *Contractor* shall ensure that any NR Possessions required to Provide the Works are properly resourced and managed including adherence to Network Rail Standard NR/L3/INI/Draft version 1 “Delivering Works Within Possessions”.

The *Contractor* shall submit in writing to the *Project Manager* for Network Rail’s agreement all its proposals for the provision of personnel to supervise site works in NR Possessions.

10.5.3.2 Confirming Network Rail Possessions

The notice periods for booking of NR Possessions are dependent upon the duration and location of the Relevant Works Package.

In order to comply with Network Rail’s notice periods for the booking of NR Possessions the *Employer* has already confirmed (“booked”) those NR Possessions identified as such in the NR Possession Plan.

For those NR Possessions included in the NR Possession Plan which have not already been booked, the *Contractor* shall, by the date indicated in the NR Possession Plan, notify the *Project Manager* whether he still requires the relevant NR Possession in order to Provide the Works. If the *Contractor* no longer requires the NR Possession his notification shall include an explanation justifying why the *Contractor* considers the NR Possession is no longer required.

Upon receiving the *Contractor*’s confirmation that the NR Possession is required, the *Project Manager* shall proceed to book the relevant NR Possession.

The *Project Manager* shall notify the *Contractor* when he receives Network Rail’s acceptance to a NR Possession. If Network Rail do not accept the NR Possession requested, the *Project Manager*, if necessary after consultation with Network Rail shall instruct any required changes to the NR Possession Plan.

The *Contractor* is deemed to be familiar with the Network Rail planning process and will be required to provide requisite documentation and representatives at the relevant planning meetings as necessary to support the approval and management of all NR Possessions.

10.5.3.3 Changes to the contract Possession Plan

The Possession Plan identifies those NR Possessions that are considered necessary in order to Provide the Works and therefore represents the minimum practicable level of disruption to the Network and the services provided by TOCs and FOCs.

Consequently, changes to the Possession Plan after the contract date are discouraged unless such changes reduce further the amount of disruption caused by the *works* to the Network and the services provided by TOCs and FOCs.

Notwithstanding the above, the *Employer* recognises that in particular circumstances it may be necessary for the *Project Manager* to instruct changes to the Possession Plan. Examples of such changes in circumstances include the occurrence of compensation events, delay to the *works* and Network Rail failing to make available or cancelling any NR Possession.

The *Contractor* upon becoming aware, for whatever reason, that a change to the NR Possession Plan is necessary in order to Provide the Works, shall notify the *Project Manager* using the Possession Change Request Form identified in Appendix 10C. The *Contractor* shall include with the Possession Change Request Form a revised Relevant Works Package Schedule for the *Project Manager's* acceptance.

To increase the likelihood of changes to the Possession Plan being acceptable to Network Rail, the *Contractor* should be aware of the following general constraints regarding the availability and use of NR Possessions:

- NR Possessions will not normally be available during the normal weekday working hours;
- Special occasions (which could include particular football fixtures, concerts and the 2012 Olympics) or whilst Network Rail have engineering possessions on other lines;
- Public Holidays and the summer period which extends for 4 months from the last Sunday in May to the last Sunday in September are often restricted, as are special event days when additional passenger services may be provided;
- The various types of NR Possession potentially available include:
 - Normal or White Period Possessions – these NR Possessions, predominantly at night, usually involve the short-duration occupation of the Network between the normal operating train services. Often referred to as “free period possessions”, this type of NR Possession does not involve any payment of costs or compensation to Network Rail;
 - Normal or Grey Period Possessions - similar to White Period Possessions, the difference being that these types of NR Possession are associated with the specific diversion of some or all of the train services over alternative routes. Clearly these types of NR Possession are only available where suitable diversion routes exist and are used most frequently where only freight traffic is affected and not passenger services. Likewise for White Period Possessions, duration is usually short lasting only a few hours;
 - “Between Trains” Possessions or Rule TII Possessions. These NR Possessions are taken between the normally operating train services. Consequently their availability and use is constrained by the frequency of the train services; and
 - Abnormal Possessions – invariably involve cancellation and/or disruption to the affected TOC's regular services and consequently affect TOC timetables. The maximum notice periods for these types of NR Possession are required as described below.

To maximise the time available for Network Rail to consult with the affected TOCs or FOCs and for the pre-planning and co-ordination of NR Possessions across the

Network, the *Contractor* shall where practicable, notify the *Project Manager* of a proposed change to the Possession Plan no later than 66 weeks (and preferably 96 weeks) before each timetable change date preceding the timetable period within which any additional NR Possession is required.

Any notification from the *Contractor* of a change to the Possession Plan shall be accompanied by the appropriate technical submissions necessary to satisfy Network Rail that the continued safe operation of the Network is protected.

Any notification from the *Contractor* of a change to the Possession Plan which is a request to cancel one or more of the NR Possessions identified shall:

- be made as early as practicable in order to minimise the amount of cost and compensation payable to Network Rail; and
- include an explanation justifying why the *Contractor* considers the NR Possession or NR Possessions is/are no longer required.

A change to the Possession Plan is only confirmed when the *Project Manager* notifies the *Contractor* of Network Rail's acceptance by giving an instruction changing the Possession Plan.

Any contract specific constraints on the availability and use of NR Possessions are stated in Volume 2A of the Works Information.

10.5.3.4 NR Possession Management Meetings

As part of the NR Possession management process, the *Contractor* shall participate in NR Possession planning meetings with the *Project Manager* and representatives from Network Rail with the objective of satisfying Network Rail that the Relevant Works shall be carried out in a safe and efficient manner.

The *Contractor* shall attend any pre-planning meetings required by the *Project Manager* and/or Network Rail.

Failure by the *Contractor* to attend these meetings may result in the cancellation of the work planned for the relevant NR Possession.

10.6 Network Rail Requirements

10.6.1 General

This part of the Works Information sets out the requirements with which the *Contractor* shall comply when carrying out the Relevant Works.

10.6.2 Network Rail Standards and Procedures

The *Contractor* shall comply with the Standards.

The *Contractor* shall put in place a system in order that he becomes aware of the publication by Network Rail of any revisions to the Standards current at the contract

date. This can be done by subscribing to Network Rail's bi-monthly issue of new and updated Standards. As soon as the *Contractor* becomes aware of any revision to the Railway Standards he shall, before implementing any such revision, give an early warning to the *Project Manager* by notifying him in accordance with the *conditions of contract*. The *Project Manager* upon receipt of the *Contractor's* notification shall instruct the *Contractor* either to comply with the revised Standards or, for the time-being to ignore the revision pending the *Employer's* application for a derogation.

10.6.3 CDM Regulations

For the purpose of undertaking any of the Relevant Works, the *Contractor* shall act as the Principal Contractor for the purpose of the CDM Regulations unless notified otherwise by the *Project Manager*. Such a notification is only likely to be given in the event of joint occupation by the *Contractor* and Others of the same part of the Network.

10.6.4 Subcontractors

The *Contractor* shall appoint only Subcontractors who are on the list of contractors approved by Network Rail for carrying out work on the Network.

10.6.5 *Contractor's* Responsibility for Maintenance of the Network Rail Network

Network Rail has appointed an IMC with responsibility to maintain the existing Network.

Where the *Contractor* is required to occupy parts of the Network to Provide the Works, only in exceptional circumstances and where described elsewhere in the Works Information, shall the IMC's maintenance responsibilities for those parts of the Network (including adjacent parts of the Network directly affected by the occupation) transfer to the *Contractor*.

Whether or not the *Contractor* is required to assume responsibility for maintenance as described, he shall be responsible for the actions described for the "Project Works Contractor" in Network Rail Line Procedure RT/D/P/088 "Responsibility for Maintenance of Changed Assets". This procedure sets out, the requirements for ensuring that responsibilities for maintenance of Network Rail's assets are correctly allocated during the *works*. In order to ensure a clear split of responsibility the *Contractor* shall prepare, implement and comply with the allocation of maintenance responsibility procedures to and from the IMC, in line with the principles set out in Network Rail Line Procedure RT/D/P/088. These procedures shall be prepared and agreed with Network Rail and the IMC, through the *Project Manager*, before proceeding with the relevant work.

Where the *Contractor* has responsibility for maintenance as described he shall demonstrate to the *Project Manager* that he or, if relevant his Subcontractors has the required knowledge and competent people to undertake this maintenance.

10.6.6 Network Rail's Particular Health and Safety Requirements

This part of the Works Information describes the particular health and safety requirements applicable to work on or about the existing Network and is therefore to be considered supplementary to the general health and safety requirements set out in

Works Information Volume 2B Part 19 Health and Safety Management and other parts of the Works Information.

The Railway is a particularly hazardous environment. The danger from train movements, overhead power lines and electrified rails at ground level must not be underestimated. The rail industry's safety policy and safety management systems require the enhancement of some safety legislation and this part of the Works Information indicates areas where the legislative requirements are strengthened.

The *Contractor*, as part of its construction phase plan (as defined in the Construction Design and Management (CDM) Regulations 2007) shall develop and implement systems, procedures and working practices that avoid risk to the Railway and that protect those persons involved in carrying out the *works* from risks arising from the Railway. These shall be submitted to the *Project Manager* for acceptance prior to the relevant work being undertaken.

Specific training (i.e. Personal Track Safety Training) and competency requirements apply to persons who work on Network Rail's infrastructure and operational track or require access on or near the line. The training and competence requirements for any Relevant Works Package shall be agreed with the *Project Manager* before access is allowed. The *Contractor* shall act in accordance with inter alia, the following health and safety requirements:

- All accidents and occurrences causing damage to property or potentially affecting the safe working of the Railway, together with all Reportable Injuries and Dangerous Occurrences as defined in the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (as amended from time to time) must be reported to the *Project Manager* and to Network Rail. Details of all such events shall be recorded in a format agreed with the *Project Manager* and a copy sent to Network Rail within 24 hours of any such event.
- The Railway (Safety Critical Work) Regulations 1994, and the supporting guidance documents, place strict limitations upon the hours that can be worked by persons who undertake Safety Critical Work as defined by the regulations. During the undertaking of any Relevant Works Package, if any of the *Contractor's* employees are required to carry out Safety Critical Work the *Contractor* shall be required to demonstrate compliance with the regulations.
- The *Contractor* shall, in addition to complying with the Employer's policy on drugs and alcohol, comply with Network Rail's current policy on Alcohol and Drugs, a copy of which will be provided by the *Project Manager*.
- The use and storage of inflammable substances is severely restricted in many locations on the Network. The *Contractor* shall comply with any constraints on the storage of such substances applicable to the site within which he is working.
- The *Contractor* shall not use any Equipment incorporating lasers without the written acceptance of the *Project Manager* and subject to such acceptance being given, the *Contractor* shall comply with the Network Rail codes of practice on the

use of lasers and any British and European Standards included in the Crossrail Standards Baseline.

- The *Contractor* shall not store or use explosives on or about the Network without the written acceptance of the *Project Manager*. Where accepted, the *Contractor* shall provide evidence of full compliance with all current legislation relating to the acquisition, storage, keeping and use of explosives prior to bringing them to the Site.
- The *Contractor* shall not use halons in hand held fire extinguishers and new fixed fire fighting systems based on halons anywhere on the Network.
- The *Contractor* shall comply with all restrictions described in the Standards on the use of fixed and portable electrical or electronic equipment near installations and cable routes associated with the lineside signalling and telecommunications apparatus.
- Excavations near the Railway Infrastructure shall be in accordance with agreed method statements and not commence until all measures required to monitor and maintain the stability of the track and/or structure have been implemented and Network Rail has indicated that there is no further objection to proceeding with the excavation work.
- The *Contractor* shall ensure that any Equipment working or Plant and Materials placed, stacked or handled in the vicinity of an operating track do not foul or have the potential to foul at any time the vertical airspace within 3 metres of the nearest running rail or overhead line electrification (OHLE) equipment or conductor rail except in special circumstances previously accepted in writing by the *Project Manager*. Similarly, no Equipment or Plant and Materials shall be handled in such a manner that in the event of mishandling or failure they come within a vertical plane 3 metres of the nearest running rail or OHLE equipment, or on a station platform, within 3 metres of the platform edge unless previously accepted in writing by the *Project Manager*.

To comply with these constraints adequate control and protection measures shall be put in place by the *Contractor* which if necessary shall include the provision of a physical separation between the *Contractor's* construction activities and the operational railway.

Where there remains a risk, as a result of the *Contractor's* operations, of any object falling within 3 metres of an operating track, the OHLE or a platform edge, the relevant work shall be carried out under a NR Possession unless the *Contractor* can demonstrate to the *Project Manager* that his method of working eliminates the risk.

- The *Contractor* shall be aware of the possible presence of buried Services including high voltage electrical power cables which are often obscure and difficult to trace on railway land. Network Rail restrict the use of portable electrical or electronic cable service location equipment near apparatus associated with lineside signalling and telecommunication equipment. Certain

types of equipment (Cable Avoiding Tools (CATs) for example) are approved for locating the position of buried pipes, ducts and cables but their use by the *Contractor* shall be strictly in accordance with the relevant Group Standards and must be pre-authorized by Network Rail.

The *Contractor* is advised that on passive mode CAT scanners will not detect cables/services more than 3m deep, at best, and, unless used on active mode, will not detect cables that are de-energised, or if so, at a considerably reduced depth. The *Contractor* shall not use a scanner of any type in active mode on the Railway Infrastructure.

- The *Contractor* shall undertake a full survey to ascertain the location and nature of any Services within the Worksite. The *Contractor* shall take adequate measures during the provision of the works to protect all existing Services from damage. The extent of existing protection provided to Services on or about the Railway Infrastructure can vary and the *Contractor* shall not interfere with or move existing Services without the agreement of the *Project Manager*. Particular attention is drawn to the increased overburden pressures caused by the movement or positioning of heavy items of Plant and Materials or Equipment in the vicinity of existing buried Services.

The *Contractor* shall take additional precautions to establish the existence, position and location of any existing buried Services which may be present before any excavation or the driving of objects into the ground is undertaken.

Should the *Contractor* discover or uncover any unknown or unexpected Services, all work in the vicinity of such Services shall stop and ownership of the Service established. The *Contractor* shall inform the *Project Manager* and the owner of the Service and adequate precautions taken prior to recommencing the relevant work.

Any Service not diverted shall be supported, maintained, protected as necessary and kept in working order in this existing location.

Where temporary or permanent service diversions are necessary the *Contractor* shall agree a method and routing specification with the *Project Manager*. The service provided shall be maintained at all times unless otherwise agreed with the *Project Manager*.

Any changes by the *Contractor* in routing of electricity supply cables over or under the Railway shall take into account the requirements of the EC directive on Electro Magnetic Compatibility where such cables will come within 10m in any direction of running rail (including under the rails). Euronorm EN 50121 applies.

Any work on or to Network Rail's electrical equipment, signalling and operational telecommunications systems shall be carried out by persons passed competent in accordance with the Standards and be carried out to meet the requirements of the Standards.

10.6.7 Occupational Hazards Within The Railway Environment

Contamination in various forms is common within the railway environment due to various historical activities. Areas previously used for railway depots and sidings have been

particularly affected. When developing the construction phase plan (as defined in the Construction (Design and Management) Regulations 2007) and associated safe systems of work the *Contractor* shall be aware of those areas where contamination is most likely and shall include provision for managing the risks associated with working near to or handling contaminated material. Works Information Volume 2B Part 19 Health and Safety Management sets out the necessary precautions to be taken and the reporting procedures to be followed if contamination is found.

In addition to the obvious hazard represented by moving trains, the *Contractor's* attention is drawn to the following hazards for which he shall put in place adequate mitigation measures to reduce, eliminate or control the risks arising therefrom.

10.6.7.1 Human Excrement

Railway lines may be used by trains which are not fitted with controlled emission toilets. There may consequently be a risk of infection from discharged human excrement.

10.6.7.2 Asbestos

The use of asbestos (in all its various forms) has been extensive throughout the railway industry in previous years. The *Contractor* shall assume that asbestos containing materials are present in the Worksite and complete surveys to assess the risk at each location.

10.6.7.3 Lead

Protective and decorative coatings containing substantial quantities of lead may have been used on railway bridges, structures and buildings and this should be assumed unless testing shows otherwise. The presence of lead cables and cabling should also be assumed.

10.6.7.4 Cadmium

Cadmium may have been used as an anti-corrosion plating on some metal products on or about the railway.

10.6.7.5 Anthrax

The presence of anthrax spores has been detected on or about the railway.

10.6.7.6 Leptospirosis

There may be a risk of leptospirosis (Weils disease) as a result of contamination by rats.

10.6.7.7 Electrified Railways

Attention is drawn to the presence in some areas of electric traction equipment associated with either overhead line equipment above and at track level and/or third or fourth conductor rails at track level. Either system carries a potentially lethal electric current and the close proximity to this equipment can cause death or severe injury.

Warning notices acceptable to Network Rail shall be erected in prominent positions agreed by Network Rail.

All requirements as advised by Network Rail as to the earthing and bonding (or electrical segregation) of metalwork and foil covered sheet materials shall be complied with.

Further robust procedures (in addition to those referred to in 10.6.9) shall be established and maintained to ensure safe access for all persons to the Railway Infrastructure and safe working practices where the Railway Infrastructure is electrified. These procedures must be submitted to the *Project Manager* and Network Rail for written approval prior to the Relevant Works Package being undertaken.

Electric traction equipment is charged at high voltage and unless Isolation and permit to work arrangements are in force shall be treated as being live at all times and the following precautions shall be observed:

- Work shall not be carried out, cranes or other plant erected, operated and/or dismantled or materials stored within the prohibited space which is that space within a radius of 3 metres of the live overhead equipment together with anywhere vertically above this space. The figure of 3 metres used in determining the prohibited space shall be increased by the length of any tool, equipment and/or material being handled. However, work on the track, platforms, walkways and the like below the overhead equipment is permitted without special precautions provided that tools, equipment and/or materials are not at any time raised above head height.
- Long objects, which shall include but not be limited to, pipes, scaffolds, poles, ladders and/or long handled tools or any object of such length that if carried vertically could infringe on the prohibited space shall be carried horizontally below head height.
- Electrically conductive surveying equipment shall not be used within 3 metres of any overhead line equipment or any rail.
- Any disturbance of or attachment to any equipment forming part of the electric traction system shall only be carried out with the full consent of Network Rail.
- Work in the vicinity of third or fourth rail electrification will involve the provision of special protection or isolations to the equipment.
- Electrically conductive surveying equipment shall not be used within 3 metres of any rail including electrified third rail.
- At the sole discretion of Network Rail it may be appropriate for protective screens adjacent to overhead line equipment or third /fourth rail electrification to be provided to enable certain works to continue without Isolations being required.
- At the sole discretion of Network Rail it may be appropriate for crash decks to be provided to enable certain works to be carried out above the Railway without NR Possessions being required.

- At the sole discretion of Network Rail it may be appropriate for a temporary access structure above the overhead line equipment to be provided to permit continued working without Isolations being required.

Erection, inspection, maintenance and removal of screening and/or platforms and/or access structures shall be carried out under the protection of Isolations and NR Possessions unless otherwise agreed by Network Rail.

10.6.8 Access To The Network For Network Rail

The *Contractor* shall provide access for Network Rail to the Network and to any other Network Rail Property at all times (24 hours a day, 7 days a week) for the purpose of maintenance and repairs. Such access may be required at less than one hours notice.

10.6.9 Access to Network Rail Property For The *Contractor*

Before any activity is undertaken in connection with the *works* which requires access to Network Rail Property, the *Contractor* shall obtain written confirmation from the *Project Manager* that the appropriate authority has been obtained from Network Rail for access and details of any conditions under which such access shall be granted.

Before proceeding with any work requiring access to Network Rail Property the *Contractor* shall put in place and maintain robust procedures to ensure safe access for all personnel to the Railway in connection with the Relevant Works which recognises the existing points of access to the Railway. These procedures shall be submitted to the *Project Manager* for acceptance prior to access being granted.

No person shall be permitted to access Network Rail Property beyond the agreed limits of the *Contractor's* Site or agreed access routes. The *Contractor* shall not interfere with existing points of emergency access to the Network without the prior written agreement of Network Rail.

The *Contractor's* employees shall not cross or convey Equipment and/or Plant and Materials across or along any railway track unless special arrangements are made and written consent obtained from Network Rail. Where public rights of way exist over occupation and/or accommodation level crossings and/or bridges, these crossings shall only be used in the way that they are intended to be used by the public unless special arrangements are made and written consent obtained from Network Rail.

Only in very exceptional circumstances will the provision of a temporary level crossing be permitted. Where Network Rail is prepared to accept the provision of a temporary level crossing for constructional traffic and/or public use sufficient time must be allowed for obtaining the appropriate approvals and the period of notice required by Network Rail for making the necessary arrangements for carrying out the relevant work.

10.6.10 Not used

10.6.11 Sites

The *Contractor* shall comply with the following Site requirements:

10.6.11.1 Site Representation

The *Contractor* shall appoint a full-time senior representative at the Site and/or the Working Areas during the execution of all Relevant Works Packages. Prior to commencement of work on the Site and/or the Working Areas, the *Contractor* shall provide the *Project Manager* with a list of names and telephone numbers for personnel responsible for organising remedial action in the event of an emergency on the Site and/or Working Areas when the Site and/or the working Areas are unattended. Supervisory staff at the Site and/or the Working Areas must have sufficient knowledge of English (both spoken and written) to understand and relay safety information, instructions and training to all personnel.

10.6.11.2 Screening, Fencing, Hoardings, Barriers and Advertisements

The *Contractor* shall:

- to the extent that Network Rail considers appropriate, during the carrying out of the Relevant Works and to the satisfaction of Network Rail temporarily erect fencing to protect Network Rail Property from trespass and vandalism; and
- provide for such barriers, watching and lighting of the Relevant Works as may be necessary.

Any screening, fencing, hoarding and barriers on or adjacent to the Network shall comply with the relevant Railway Standards. Advertisements must not be displayed on or about land in the ownership of Network Rail.

10.6.11.3 Site Lighting

The *Contractor* shall comply with the requirements of Network Rail with regard to Network Rail's signalling arrangements and the prevention of any adverse effects which may be caused by the lighting of the Relevant Works. All site lighting shall be placed or screened by the *Contractor* so as not to interfere with any signal lights and Driver Only Operation (DOO) platform monitoring devices. Site lighting shall be positioned such that it does not affect the signal sighting or vision of train drivers or obscure places of trackside safety. The *Contractor* shall also be aware of and take into account the presence of buried services when determining the position of lineside temporary lighting equipment. Red, yellow and green lights shall not be used where their meaning could be misinterpreted by train drivers. Flashing yellow lights may only be used on or about the existing Network with the acceptance of the *Project Manager*.

10.6.11.4 Security

The *Contractor* shall put in place an effective site security system for those Sites and/or Working Areas on or adjacent to the Network to ensure the operating railway is not put at risk in any way by the presence of unauthorised persons (refer also to Works Information Volume 2B Part 16 Security). All Equipment and Plant and Materials shall be kept safe and secure when not in use and shall be located so as to avoid opportunity for trespass or vandalism on or directed against the Railway or land in the ownership of Network Rail.

10.6.11.5 Protection to Railway Equipment

The *Contractor* shall design, construct, maintain and remove on completion of the Relevant Works Package any temporary protection required to prevent damage to the tracks, signal and telecommunication equipment or contamination of track ballast.

10.6.11.6 Confined Spaces

A considerable number of confined spaces exist on or about the Railway Infrastructure. The *Contractor* shall comply fully with the requirements of the Confined Spaces Regulations 1997 and the Associated Code of Practice.

10.6.11.7 Clothing and Personal Protective Equipment

All persons engaged in the contract must wear high visibility clothing of an approved colour, type and design (including retro-reflective strips) acceptable to Network Rail when on Site and/or the Working Areas. The personnel protective clothing must be worn correctly and kept in a clean condition.

10.6.11.8 Removal of the *Contractor's* Employees

Network Rail may object to and require the immediate removal from the Site and/or the Working Areas of any person thereon who in the opinion of Network Rail is not in a fit condition to carry out their duties, or is liable to endanger their own health and safety or that of others. Such persons will not be permitted further access to the Site and/or the Working Areas.

10.6.11.9 Registers and Certificates

All registers, site diaries and certificates relating to the Relevant Works Package being undertaken must be available for inspection by Network Rail at the relevant Site and or Working Area or at such other location agreed with Network Rail.

10.6.11.10 Emergency Action

A detailed procedure for dealing with emergencies relating to the Site and/or Working Area shall be produced by the *Contractor* in consultation with the *Project Manager* and Network Rail. This procedure shall be accepted in writing by Network Rail before construction activities start and shall be reviewed and updated as circumstances vary. Key actions shall be set out on a poster to be prominently displayed in locations to be agreed with the *Project Manager* and Network Rail. These must include the method of stopping trains in the event of an incident that could affect the safety of trains and/or persons and, in the case of an electrified line, how to arrange to have the current switched off.

All staff and operatives shall be made fully conversant with this procedure. Auditable checks should be undertaken at intervals to be decided by Network Rail to monitor this understanding and evidence thereof shall be maintained on site and shall be made available for inspection by the *Project Manager* and Network Rail.

10.6.11.11 Rail Traffic During a NR Possession

During a NR Possession it may be necessary for engineer's trains and/or on-track machines to pass through the Worksite by prior arrangement. This will necessitate the temporary clearance of the railway track and cessation of those activities that could affect their passage or the safety of personnel on or near the line.

10.6.12 Competency and Training of People

The *Contractor* shall be responsible for ensuring before any of his people go to work adjacent to, under, on, or above the Network that they undergo various training and briefing requirements set out in the Group Standards and described below. This requirement includes all Sites and/or Working Areas located adjacent to the Network.

10.6.12.1 Training

Prior to the commencement of and during the Undertaking of a Relevant Works Package, familiarisation training and briefings shall be given to everyone who has access to the Worksite. Records of training and briefings are to be retained on the Worksite and made available for inspection when requested by the *Project Manager*. Certain activities carried out may require railway specific training. These activities will be identified and notified to the *Contractor* by the *Project Manager* at the time that Network Rail's agreement in principle is notified to the Relevant Works Package Schedule. Additional familiarisation training will be required if any of the Site and/or Working Area characteristics change.

10.6.12.2 Fire Safety

Personnel shall receive specific instructions related to fire safety and undergo training commensurate with their duties and location.

10.6.12.3 Emergency Preparedness

An acceptable level of contingency and emergency preparedness training of staff is required.

10.6.12.4 Site Visitors

All visitors to the Sites and/or the Working Areas, including Network Rail staff shall be briefed on the particular health and safety hazards of the *works*. Records of all such briefings must be kept for audit purposes.

10.6.12.5 Personal Track Safety (PTS) Training, and Alcohol and Drug Screening

All staff undertaking work on or near the operational railway are required to be PTS certificated in accordance with Standards and comply with Network Rail's alcohol and drugs screening requirements.

10.6.12.6 Confined Spaces

The Contractor provides training for entry into confined spaces as necessary for certain activities.

10.6.12.7 Pre-Track possession briefing

Network Rail considers the briefing of all personnel (at the commencement of each shift) that are involved with operations under NR Possessions as particularly important and such briefings shall be mandatory. Briefing of all personnel (at the commencement of each shift) on the lineside is also mandatory even if the line itself is not under a NR Possession. The *Contractor* shall be responsible for the adequate briefing of his personnel as required by this provision.

10.6.13 Communications

The maintaining of good working relations with Network Rail is essential to a successful outcome for the *Employer*. For this reason and to ensure a controlled approach to Network Rail related matters all communications between the *Contractor* and Network Rail shall be through the *Project Manager* except in the following circumstances:-

- during an emergency or security alert;
- to report accidents occurring on or affecting Network Rail Property;
- when instructed by an authorised Network Rail representative to take action for safety reasons (in which case the *Contractor* shall advise the *Project Manager* immediately and in writing within 24 hours of the instruction giving details of the circumstances); and
- if directed otherwise by the *Project Manager*.

The *Contractor* shall immediately take all action instructed by Network Rail pursuant to a Network Operation Issue as if such instructions were issued by the *Project Manager*.

10.6.14 The *Contractor's* Records and Audits by Network Rail

The *Contractor* shall keep records of all documents relating to the Relevant Works including inter alia:

- all health and safety documentation describing how the *Contractor* proposes to comply with Network Rail's particular health and safety requirements including the Construction Phase Plans and the Health and Safety Files required by the CDM Regulations;
- environmental and quality management plans, whether or not required in support of an Assurance Case;
- the *Contractor's* quality plan and quality procedures and evidence of the *Contractor's* compliance therewith;
- test and inspection certificates for any Network Rail Property Works;
- method statements together with evidence of the *Contractor's* internal procedures for approval;

- details and records of the *Contractor's* permit to work system;
- details of the *Contractor's* system for the checking of temporary works design;
- detailed works programmes;
- risk registers and associated documentation; and
- competence assurance processes for people employed by the *Contractor*.

The *Contractor* shall allow Network Rail's representatives, the identity of whom shall be notified to the *Contractor* by the *Project Manager*, to inspect at any time the records that he is required to keep.

The *Contractor* shall also provide access to Network Rail's representatives to work being done for the purpose of auditing the work in progress.

10.7 Appendices

Appendix 10A -	Network Rail Consents
Appendix 10B -	Safe Management Plan
Appendix 10C -	Proforma NR Possession Change Request Form
Appendix 10D -	Method Statements
Appendix 10E -	Special Requirements Where The Relevant Works Comprise Network Rail Property Works

Part 11 – LU Interface

11.1 Introduction

This part of the Works Information applies to any part of the *works* constituting LU Interface Works and should be read in conjunction with the London Underground Limited (LUL) Optional Clauses.

LUL, as the owner and operator of the London Underground railway network, has:

- a duty to provide and maintain a safe railway; and
- to provide a specified level of service to its' customers.

The Project has many interfaces with the existing Underground Network at various locations along its route and its construction will impact upon the Network with the potential for disruption to LUL and to the services it provides.

The *Employer*, during the construction of the Programme, is committed to ensuring the continued safe operation of the Underground Network and to minimising disruption to LUL's operations.

To this end the *Employer* and LUL have entered into a Development Agreement to facilitate the undertaking of those parts of the *works* that are on or impact on or are in the vicinity of LUL Property or systems forming part of or interfacing with the Underground Network including without limitation protective works required as a result of the Crossrail Project (the "LU Interface Works").

The potential LU Interface Works already identified by the *Employer* are stated in Volume 2A of the Works Information.

The *Contractor* shall not carry out any LU Interface Works without the *Project Manager* having notified the *Contractor* that LUL approval to the relevant work has been obtained.

11.2 Definitions and Particular Technical Terms

In this part of the Works Information the following technical terms are used and have the meaning given in the Glossary.

11.3 The LU Interface Works

The potential LU Interface Works already identified by the *Employer* are stated in Volume 2A of the Works Information, shown on the drawings and in the specifications.

The potential LU Interface Works identified by the *Employer* may not be exhaustive of all the LU Interface Works required to Provide the Works. Depending on how the *Contractor* plans to construct the *works*, in particular the nature and extent of any temporary works

he may elect to use, there may be other parts of the *works* that have the potential to affect the stability, maintenance or operation of the Underground Network.

Within 6 weeks of the *starting date*, the *Contractor* shall notify the *Project Manager* of any parts of the *works* which he considers may constitute LU Interface Works but which have not been identified in Volume 2A of the Works Information. The *Contractor's* notification shall include an explanation, supported if necessary by drawings and other relevant information, as to why the part of the *works* notified may constitute LU Interface Works.

Upon receipt of the *Contractor's* notification, the *Project Manager* shall submit the above information to LUL to enable them to determine whether such works are LU Interface Works.

The *Project Manager* shall communicate LUL's decision to the *Contractor*. If LUL confirms that the part of the *works* is LU Interface Works then the requirements of this part of the Works Information shall apply to that part of the *works*.

The LU Interface Works shall be carried out in compliance with the Approved Works Documents. Approved Works Documents shall comprise without limitation the following:

- definition of the scope of the LU Interface Works;
- the programme for the LU Interface Works;
- provisions governing LUL's rights of inspection and surveillance of the relevant LU Interface Works; and
- an infrastructure protection plan setting out assessment, protective works, monitoring and including an emergency procedures plan.

11.4 The *Employer's* Responsibilities for the LUL Interface

11.4.1 The LUL Development Agreement

Under the LUL Development Agreement the *Employer* and LUL have agreed to work together to balance their respective commitments, namely for:

- The *Employer* to complete the Crossrail Project to time and budget; and
- For LUL to achieve the works contemplated under its PPP Agreements (and any successors to them), its PFI contracts and its other capital projects and to operate its railway undertaking for the benefit of the travelling public.

The LUL Development Agreement provides the framework for the design, delivery, completion, testing, commissioning and bringing into use of the LU Interface Works.

The LUL Development Agreement also sets out a framework for non-LU Interface Works (IM Works) that are to be handed over to LUL.

The *Employer*, working in association with LUL has developed, an infrastructure protection plan (IPP) designed to ensure the appropriate monitoring, protection and safeguarding of LUL's infrastructure from the effects of the Project, both in advance of any of the *works* and as a result of the *works*. LUL has approved the IPP for use and a copy can be found in Appendix 11.7.I hereto.

Under the LUL Development Agreement, before any of the LU Interface Works may proceed, the *Employer* needs to satisfy LUL by technical submissions that the LU Interface Works will be carried out in such a manner that:

- the safe operation of the Underground Network is ensured at all times;
- any disruption to LUL's services is as far as possible planned well in advance and is the minimum reasonably necessary to Provide the Works;
- satisfies the provisions of the infrastructure protection plan for LUL's infrastructure; and
- satisfies the requirements of LUL Standard 1-538 Assurance.

Obtaining LUL's satisfaction to the above is an iterative process involving the agreeing of Works Documents in respect of each Works Package.

11.4.2 London Underground Crossrail Team

The London Underground Crossrail Team (LUCT) is a multi-disciplinary team set up by LUL to provide advice and support to the *Employer* and consider LUL interests in the delivery of the Project. The particular functions of LUCT are described elsewhere in this Works Information.

11.4.3 LUL Interface Co-ordination

In order to facilitate and co-ordinate the work of the *Employer* across the whole of the Project and to maintain a consistent approach to the LUL interface, the *Project Manager* has been appointed as LUL Interface Coordinator responsible for planning, co-ordinating and managing the strategic aspects of the LU Interface Works.

The *Contractor* shall be responsible for co-operating and consulting with the *Project Manager* at all stages during the preparation of the information required to support the *Employer's* technical submissions and applications for LUL Closures and Possessions.

The *Project Manager's* shall:

- act as the *Contractor's* focal point for any LUL or LU Interface Works related queries;
- facilitate direct communication where appropriate between the *Contractor* and LUL and subject to such requirements as may be directed to enable the *Project Manager* to retain full visibility of such communications;

- review the Works Documents and other information prepared by the *Contractor* for the *Employer's* technical submissions and Possession arrangements for completeness and clarity;
- routinely monitor of the *Contractor's* progress with the preparation of the Works Documents and other information required in support of technical submissions and possession arrangements;
- routinely monitor the *Contractor's* co-ordination with the work of Others insofar as it relates to the LUL interface; and
- issue instructions relating to the LU Interface Works and all requirements of LUL

For the avoidance of doubt, the appointment of the *Project Manager* to provide co-ordination with LUL does not diminish the *Contractor's* responsibility to provide all of the Works Documents and other information in support of the technical submissions and applications for Closures and Possessions.

11.5 The *Contractor's* Main Responsibilities

11.5.1 General

Consistent with the *Employer's* responsibilities under the LUL Development Agreement and the *Contractor's* responsibilities under this contract, the *Contractor's* main responsibilities are:

- to notify the *Project Manager* of all consents and approvals required in respect of LU Interface Works specifying when such consents are likely to be required;
- to ascertain and provide all information in support of technical submissions and Closure and Possession applications;
- to ascertain when all such submissions and applications need to be submitted to allow sufficient time for review by LUL and, if appropriate, revision and re-submission; and to identify all such activities in the programme submitted to the *Project Manager*;
- to seek preliminary guidance from LUCT, where appropriate, regarding the form, content and timing of all submissions and applications and of all constraints which may impact on the LU Interface Works;
- to seek to reach provisional agreement with LUL, via LUCT, and the *Project Manager* of all significant matters prior to formal submissions or applications;
- to provide Works Documents and other information to the *Project Manager* which the *Employer* requires to comply with the procedures for arranging and implementing LUL Closures and Possessions;
- to provide Works Documents and other information to the *Project Manager* which the *Employer* requires to satisfy LUL that at the start of, during and after the

construction of the LU Interface Works the continued safe operation of the Underground Network is ensured at all times;

- where the *Contractor* is responsible for the design of any LU Interface Works, to compile the Work Package Plan and Execution Plan and consult with LUL via the *Project Manager* on the technical adequacy of his design before submitting the associated design particulars to the *Project Manager* for acceptance and submission for non-objection by LUL;
- to comply with the particular LUL working constraints of the Access Code. A copy of the Access Code can be found in Appendix 11H hereto;
- to provide the LU Interface Works and correct any Defects relating to the LU Interface Works in such a way as not to cause delay or disruption to LUL and/or LUL contractors;
- to appoint a LUL Interface Manager who shall be considered a key person for the purpose of Clause 24 of the *conditions of contract*. The *Contractor's* LUL Interface Manager shall be responsible for the management, co-ordination, delivery and control of all of the *Contractor's* activities relating to the LUL interface;
- to appoint a LUL accredited 'Supplier Representative' to meet the requirements of LUL Standard 1-552 Contract QUENSH Conditions. The *Contractor's* LUL Supplier Representative shall be responsible for reviewing the method of work to identify safety critical activities, for reviewing and approving Method Statements for all LU Interface Works, responsible for the QUENSH deliverables, and ensuring that they and their supply chain satisfy QUENSH requirements; and
- to co-ordinate the *Contractor's* work with that of Others.

The *Contractor's* responsibilities are set out in more detail below.

11.5.2 Working on or adjacent to the Underground Network

11.5.2.1 Safety

When undertaking LU Interface Works, the *Contractor* shall comply with LUL Cat.1 Standard Contract QUENSH Conditions.

The *Contractor's* attention is drawn to the QUENSH Menu tool forming Attachment 1 to QUENSH a copy of which can be found in Appendix 11E hereto.

11.5.2.2 General

The *Employer* has agreed with LUL a process of continual liaison and formal technical submissions through which it is intended to satisfy LUL that the design and construction of the LU Interface Works will be carried out such that the safe operation, of the Underground Network is ensured at all times.

The technical submission process, which must precede the construction of any of the LU Interface Works, comprises:

- preliminary discussions including submission of Works Package Plan proposals; and
- Execution Plan Submission including Safe Method of Working Statement.

For those LU Interface Works identified in the Works Information the *Employer* has already initiated preliminary discussions with LUL on a number of matters including:

- the likely impact upon and the potential risks to LUL's operations during construction of the LU Interface Works;
- the outline construction programme for the LU Interface Works; and
- a preliminary programme for the submission of the Works Package Plan Proposals and Execution Plan Submissions (including Safe Method of Working).

As the design and construction planning of the works advances, the *Contractor* shall be responsible to the *Project Manager* for the Works Package Plan Proposals and Execution Plan Submissions for each of the LU Interface Works. The type of information required from the *Contractor* and the timing of its provision having regard to the time required for LUL's consideration is described below.

11.5.2.3 Works Package Plan Submissions

A Works Package Plan Submission is required to be prepared by the *Contractor* (if not already prepared by the *Employer*) for each of the LU Interface Works. The Works Package Plan Submission gives preliminary details of the proposed LU Interface Works for LUL's consideration ahead of the more detailed Execution Plan submission(s). In general terms the Works Package Plan Submission shall contain sufficient information in order for LUL to understand the necessity and rationale for the LU Interface Works. A checklist is used to help assess the operational and other impacts of the works and to inform the development of Execution Plan proposals.

A template for Work Package Plan Submission can be found in Appendix 11F hereto.

Volume 2A of the Works Information indicates, for each of the LU Interface Works so far identified, any Works Package Plan Submissions already made by the *Employer* together with LUL's responses, if any, thereto.

11.5.2.4 Execution Plan Submissions

A separate Execution Plan Submission is required to be prepared by the *Contractor* (if not already prepared by the *Employer*) for each of the LU Interface Works. The Execution Plan Submission shall be submitted by the *Project Manager*, following the response from LUL to the relevant Works Package Plan Submission. The Execution Plan Submission is the final stage of the technical submission process and is the submission required to obtain LUL's non-objection to the LU Interface Works. The

Execution Plan in conjunction with other Works Documents must include the detailed information necessary to allow LUL to assess the design of the LU Interface Works for technical adequacy. These Works Documents also demonstrate, the likely impact of the construction of the LU Interface Works on the safe operation of the existing Underground Network with measures agreed to mitigate risk and how to respond to emergencies should the need arise.

A template for Execution Plan Submissions can be found in Appendix 11G hereto.

Volume 2A of the Works Information indicates, for each of the LU Interface Works so far identified, any Execution Plan Submissions already made by the *Employer* together with LUL's responses, if any, thereto.

11.5.2.5 Timing of the Provision of the *Contractor's* Information for Technical Submissions

The *Project Manager* shall be responsible for formally submitting to LUL all Works Package Plan Submissions, Works Documents and Execution Plan Submissions prepared by the *Contractor*.

The Work Package Plan comes first and determines the number, nature and content of assurance deliverables and Execution Plan Submissions. The *Contractor*, *Project Manager* and a representative of LUCT together review and agree the first draft of a Work Package Plan Submission.

For the avoidance of doubt, the time allowances below apply to Works Package Plan Submissions, Works Document Submissions and Execution Plan Submissions. For each Works Package, the *Contractor* shall include on all programmes submitted to the *Project Manager* the dates when the *Contractor* plans to submit the information necessary for inclusion in the Works Package Plan Submissions, Works Document Submissions and the Execution Plan Submissions. The *Contractor* shall make separate time provision for all necessary pre-mobilisation LUL approvals and consents (see 11.5.3 below).

In order to avoid delays to the technical submission process the information to be provided by the *Contractor* to the *Project Manager* shall be:

- in a form that is complete and sufficiently clear to enable a full and proper assessment by the *Project Manager* and subsequently LUL; and
- submitted at such times to allow the *Project Manager* and LUL to do their work as set out more fully below, having regard to the dates when the *Contractor* plans to commence the LU Interface Works.

When determining the dates on or before which the *Contractor* plans to submit to the *Project Manager* the information required to support the Works Package Plan Submissions and Execution Plan Submissions, the *Contractor*, having regard to the dates when he plans to commence the LU Interface Works, shall make provision for the following:

- a period of 6 weeks from receipt of the information provided by the *Contractor* in support of the Works Package Plan Submissions or Execution Plan

Submissions for the *Project Manager* to assess the *Contractor's* submission, complete discussions with LUL (allows up to 20 working days) and return comments to the *Contractor*.

- a period of 2 weeks for the *Contractor* to resolve all issues highlighted by the discussions with LUL and to respond with revised proposals;
- a period of 3 weeks from receipt of the revised information provided by the *Contractor* in support of final Works Package Plan Submissions or Execution Plan Submissions for the *Project Manager* to assess the *Contractor's* submission and include in the formal technical submission to LUL (allows up to 10 working days for LUL final review); and
- a further period of 1 week for the *Project Manager* to consider LUL's response and communicate their acceptance (letter of non-objection) or any LUL bars to approval to the *Contractor*.

11.5.2.6 Bars to Approval For Execution Plan Submissions

LUL's rejection of any Execution Plan Submission (or part thereof) is referred to as a "bar to approval". If LUL should reject any Execution Plan Submission, and such rejection is related to information provided by the *Contractor*, the *Project Manager* shall communicate LUL's response in the form of an issues log to the *Contractor* explaining LUL's comments. The *Contractor* shall resubmit to the *Project Manager* the required responses to the issues log so that the *Project Manager* can close out the issues log with LUL and issue the *Contractor's* addendum to the original Execution Plan Submission. The *Project Manager* shall submit the addendum to the Execution Plan Submission to LUL. The *Contractor* shall be aware that the same time allowance applies to the approval of addenda to Execution Plan Submissions (referred in 11.5.2.5 above).

11.5.2.7 Copies of Information

As a minimum the *Contractor* shall provide the *Project Manager* with one original ('wet signature') copy and an electronic copy of all information necessary to support the technical submissions.

Additional copies may be required for specific LU Interface Works. Details are to be agreed in the Work Package Plan Submissions.

11.5.3 LUL Closures and Possessions

11.5.3.1 General

In this part of the Works Information, "Engineering Hours", "L&E Closures", "Minor Closures", "Platform Access Closures" and "Responsible Infracore" shall have the meanings given them from time to time in the PPP Agreements.

LUL Closures and Possessions may be required to carry out parts of the *works* including surveys, the construction of certain LU Interface Works and to monitor the effects of the LU Interface Works on the Underground Network.

Any LUL Closure and Possession constitutes disruption to the Underground Network and consequently their use is to be avoided unless absolutely necessary to Provide the Works. If the need for Closures and Possessions cannot be avoided then they shall only be carried out on dates and times agreed with LUL.

Where the use of LUL Closures and Possessions is unavoidable strict procedures must be followed to ensure such use is planned well in advance to minimise the disruption caused to LUL and its passengers.

If a Possession of the Network is required in order to carry out a Works Package the *Project Manager* with the assistance of the *Contractor* shall consult with LUL regarding the availability of Closures and Possessions. LUL under the terms of the LUL Development Agreement have agreed that the *Employer* will be given access to the LUL Network pursuant to the terms of the Access Code.

The types of access to the Underground Network to which the *Contractor* will be entitled in accordance with the Access Code are (i) access during Engineering Hours (ii) access during lift and escalator (“L&E”) closures (iii) access during Minor Closures and (iv) access during Platform Access Closures.

The Closure and Possession Plan, if any, included at Appendix 11A of Volume 2A of the Works Information identifies those LUL Closures and Possessions, which the *Project Manager* considers are necessary in order to Provide the Works.

For the avoidance of doubt the Closure and Possession Plan is part of the Works Information and consequently:

- the LUL Closures and Possessions identified within the Closure and Possession Plan represent a constraint on how the *Contractor* Provides the Works (in particular the LU Interface Works);
- the *Contractor* provides the Works in accordance with the Closure and Possession Plan; and
- no information contained within the Closure and Possession Plan may be changed other than by an instruction given by the *Project Manager*.

The *Contractor* shall show on all programmes submitted to the *Project Manager* for acceptance, the order and timing of all LUL Closures and Possessions he plans to use to Provide the Works.

11.5.3.2 Closure planning time scales

The *Project Manager* in conjunction with LUCT undertakes LUL Closure and Possession planning in consultation with London Underground’s Service and Strategy Development Directorate. Meetings are also held with and between LUL, the *Employer*, LUL’s access works planning team, Tubelines and the Thameslink Project to coordinate closure programmes and integrate works wherever possible. To take advantage of these planning meetings the *Contractor* must comply with the Access Code and confirm to the *Project Manager* its’ closure and possession

requirements as well as the associated scope or work bank of LU Interface Works well in advance of the time scales set out in the Access Code.

For example to programme a track Minor Closure (52 hour weekend), consultation with LUL can be initiated up to 540 days in advance. To book a track Minor Closure an agreed Closure Request Form (CRF) must be submitted at least 222 days in advance. Closures are routinely programmed 18 months in advance. The *Contractor* should plan in detail any closure a minimum of 10 weeks in advance of the deadline for submitting the CRF to book a closure. A blank and sample CRF can be found in Appendix 11A hereto.

11.5.3.3 Confirming LUL Closures and Possessions

The notice periods for booking of Closures and Possessions are dependent upon the duration and location of the Works Package.

In order to comply with the *Employer's* requirements for the arranging of LUL Closures and Possessions, the *Employer* has already planned those LUL Closures and Possessions identified in the Closure and Possession Plan (if any) included in Appendix 11A of Volume 2A of the Works Information;

For those Closures and Possessions included in the Closure and Possession Plan which have not already been booked, the *Contractor* shall, by the date indicated in the Closure and Possession Plan, notify the *Project Manager* whether he still requires the relevant Closure and Possession in order to Provide the Works. If the *Contractor* no longer requires the Closure and Possession his notification shall include an explanation justifying why the *Contractor* considers the Closure and Possession is no longer required.

Upon receiving the *Contractor's* confirmation that the Closure or Possession is required, the *Project Manager* shall proceed to book it using information and a CRF provided by the *Contractor*.

The *Project Manager* shall notify the *Contractor* when he receives LUL's acceptance to the Closure or Possession. If LUL do not accept the Possession requested, the *Project Manager*, if necessary after consultation with LUL, shall instruct any required changes to the Closure and Possession Plan.

The *Contractor* is deemed to be familiar with the LUL planning process and will be required to provide requisite documentation and representatives at the relevant planning meetings as necessary to support the approval and management of all Closures and Possessions.

11.5.3.4 Changes To The Closure and Possession Plan

The Closure and Possession Plan identifies those LUL Closures and Possessions that are considered necessary in order to Provide the Works. Consequently, changes to the Closure and Possession Plan after the contract date are discouraged unless such changes reduce further the amount of disruption caused by the *works* to LUL and its passengers.

Notwithstanding the above, the *Employer* recognises that in particular circumstances it may be necessary for the *Project Manager* to instruct changes to the Closures and Possession Plan. Examples of such changes in circumstances include the occurrence of compensation events, delay to the *works* and a change to the *Contractor's* planned methods of working.

The *Contractor* upon becoming aware, for whatever reason, that a change to the Closure and Possession Plan is necessary in order to Provide the Works, shall notify the *Project Manager* in writing.

To increase the likelihood of changes to the Closure and Possession Plan being acceptable to LUL, the *Contractor* should be aware of the following general constraints regarding the availability and use of closures and possessions:

- Closures and Possessions will not normally be available during the normal weekday working hours, bank holidays, other special occasions (which could include particular football fixtures, concerts and the 2012 Olympics) or whilst LUL have engineering possessions on other lines.
- To maximise the time available to LUL for pre-planning and co-ordination of Possessions across the Underground Network, especially at bank holidays and other special occasions the *Contractor* shall where practicable, notify the *Project Manager* of a proposed change to the Closure and Possession Plan no later than 236 calendar days before the closure or possession is scheduled to take place.
- Cancellation and last minute changes to existing LUL Closures and Possessions are allowed in accordance with the 'Access Code'.
- Any notification from the *Contractor* of a change to the Closure and Possession Plan which is later than the notice periods set out in the Access Code may attract increased payment of costs to LUL. The *Contractor* shall be liable for these costs including the cost of any abortive work by LUL support staff, and these costs may be set off against amounts due to the *Contractor* in accordance with the contract.
- Any notification from the *Contractor* of a required change to the Closure and Possession Plan shall be accompanied by the appropriate Works Documents and technical submissions (described elsewhere) necessary to satisfy LUL that the continued safe operation of their Network is protected.

A change to the Closure and Possession Plan is only confirmed when the *Project Manager* notifies the *Contractor* of LUL acceptance by giving an instruction changing the Closure and Possession Plan.

11.5.3.5 Possession Management Meetings

As part of the possession management process, the *Contractor* shall participate in meetings with the *Project Manager*, LUCT and other representatives from LUL with the objective of satisfying LUL that the Access Code is being complied with and that LU Interface Works shall be carried out in a safe and efficient manner.

The *Contractor* shall attend pre-planning meetings as published by LUL.

Failure by the *Contractor* to attend these meetings may result in the cancellation of the work planned for the closure or possession.

As part of this process the *Contractor* shall plan for and book any Work Site within a closure or possession using an Application to Work Form (AWF). A blank and sample AWF can be found in Appendix 11B hereto.

11.5.3.6 Frustrated Access – Cancelled / Delayed Access

If the *Contractor* suffers cancelled or delayed access then at the time of the occurrence the *Contractor* shall complete either an LUL Nominee BCV Limited / LUL Nominee SSL Limited 'Cancelled or Delayed Access Form' (Current Ref. MR-F-31507 V2 25/6/2009), or a Tube Lines Limited 'Frustrated Access (cancelled / Delayed Access) Form' as appropriate.

The generation, signature and issue of these records by the *Contractor* are essential to substantiate any claim for a compensation event.

The procedure to be followed when submitting a claim is as follows:

- The *Contractor* shall complete a form on the night that the access was denied.
- The form should be signed as appropriate by the Station Supervisor and then faxed at the earliest opportunity to the respective Infraco. The fax machine within the Station Supervisor's Office may be available for use for this.
- SSL/BCV – 020 7038 5259 (See Appendix 11D).
- JNP – 0871 714 2082 (See Appendix 11D).
- The form should then be scanned and emailed to the *Project Manager* during the next working day.

11.6 LUL Requirements

11.6.1 General

This part of the Works Information sets out the requirements with which the *Contractor* shall comply when carrying out the Interface Works.

11.6.2 LUL Standards and Procedures

The *Contractor* shall comply with the following LUL Standards and LUL Procedures insofar as they apply to the LU Interface Works:

- the Crossrail Standards Baseline
- the Access Code

- the Contract QUENSH Conditions and
- the requirements of the Work Package Plan and Execution Plan Submissions.

11.6.3 CDM Regulations

The *Contractor* shall act as the Principal Contractor for the purpose of the CDM Regulations unless notified otherwise by the *Project Manager*. Such a notification is only likely to be given in the event of joint occupation by the *Contractor* and Others of the same part of the Underground Network.

11.6.4 Subcontractors

The *Contractor* shall seek acceptance from the *Project Manager* for all Subcontractors carrying out LU Interface Works. Only Subcontractors approved by LUL to work on the Underground Network will be acceptable to the *Project Manager*.

11.6.5 *Contractor's* Responsibility For Works on the Underground Network

LUL has appointed maintenance organisations with responsibility for day to day maintenance of the Underground Network.

The *Contractor* will not be required to take over any LUL maintenance responsibilities unless stated in Volume 2A of the Works Information or instructed by the *Project Manager*.

11.6.6 Availability of the Underground Network For LUL

The *Contractor* shall maintain access for LUL and LUL's contractors to the Underground Network and to any other LUL Property at all times (24 hours a day, 7 days a week) for the purpose of maintenance and repairs and in the case of emergency. Such access may be required at less than one hour's notice.

In the event that access to Work Sites is required to ensure the continued operation of the Underground Network, the *Contractor*, the *Project Manager* and LUL will seek to agree what access should be given to LUL, LUL's Contractors and Others.

The *Contractor* shall permit each of LUL's Engineer and LUL's Surveyor access at all reasonable times to enter the Work Sites or any parts thereof to view the state and progress of any LU Interface Works and the materials used and intended to be used and the methods of construction and installation employed.

The *Contractor* shall ensure that LUL's representatives have adequate and safe access and facilities for such purposes where LUL's representatives require access on to LUL Property controlled by the *Employer*.

11.6.7 Access to the Underground Network for the *Contractor*

Before proceeding with any work requiring access to the Underground Network, the *Contractor* shall formulate and introduce an approved system for controlling access to the Underground Network that is acceptable to the *Project Manager* and LUL.

11.6.7.1 Pre-mobilisation LUL approvals

The *Contractor* shall be responsible for meeting all pre-mobilisation approvals. As part of the pre-mobilisation checks the *Contractor* shall undertake a review of all his activities to identify the proximity of all LUL infrastructure within a fifteen (15) metre radius vertically and horizontally. The purpose of this review is to establish potential asset protection measures before work commences (e.g. Even for site establishment and the erection of hoardings). The full LUL requirements are then to be detailed as part of the construction methodology. The *Contractor* shall allow for the timescales necessary to obtain approval in addition to the time taken beforehand to plan for, prepare, consult the *Project Manager* and LUL and submit notifications. For example LUL pre-mobilisation requirements include (but may not necessarily be limited to) the following:

<u>Critical activities to achieve start on Site</u>	<u>Minimum Approval Timescale</u>
Operational Assurance Notification (OAN)	4 weeks
LUL Response time for decisions on access requests and Site Access Booking for Railway Engineering (SABRE) number granted. (Details in the Access Code)	2 weeks
For advanced station access, the minimum lead in time is 21 days.	
For advanced track access, the minimum lead in time is 28 days.	
Third party surveys (by PFI/PPP contractors) completed	12 weeks
Storage Licence approval	1 week
Customer and workplace risk assessments completed	4 weeks
Local residents notification of planned works	8 weeks
Publicity posters on stations	8 weeks
Hoarding granted	2 weeks
Hoarding closure approval	4 weeks
Hoarding concession approval	4 weeks
Closures (ticket office, waiting rooms, toilets, etc)	4 weeks
Space allocation approval	4 weeks
P2011 (BB224) Change of use approval	4 weeks

Load application approval	8 weeks
Loss of secondary revenue notification	6 weeks

The *Project Manager* in conjunction with LUCT undertakes coordinated access planning and operates the LUL 'Site Access Booking for Railway Engineering' (SABRE) system checking Access Request Forms (ARF) prepared by the *Contractor* and making final submission to LUL on behalf of the *Contractor*. To make access bookings the *Contractor* shall allow time to consult the *Project Manager* and LUCT, then prepare and submit Access Request Forms (ARF) to the *Project Manager* and LUCT for onward access booking and approval by LUL Nominee Companies or Tube Lines Limited as appropriate. Full SABRE approval shall be obtained before planned access is granted onto any part of LUL infrastructure.

A blank and sample Access Request Form (ARF) can be found in Appendix 11C.

11.6.8 Sites and/or Working Areas that are on LUL Property

The *Contractor* shall comply with the following site requirements if the LU Interface Works are required to be carried out on LUL Property.

11.6.8.1 Site Representation

The *Contractor* shall appoint a full-time senior representative at the Site during the execution of the Works Package. Prior to commencement of work on the Work Site, the *Contractor* shall provide the *Project Manager* with a list of names and telephone numbers for personnel responsible for organising remedial action in the event of an emergency on the Work Site when the Site is unattended. Supervisory staff at the Site must have sufficient knowledge of English (both spoken and written) to understand and relay safety information, instructions and training to all personnel.

11.6.8.2 Screening, Fencing, Hoardings, Barriers and Advertisements

The *Contractor* shall:

- to the extent that LUL considers appropriate, during the carrying out of the Works Package and to the satisfaction of LUL temporarily erect fencing to protect LUL Property from trespass and vandalism; and
- provide for such barriers, watching and lighting of the LU Interface Works as may be necessary.

11.6.8.3 Site Lighting

The *Contractor* shall comply with the requirements of LUL with regard to LUL's signalling arrangements and the prevention of any adverse effects which may be caused by the lighting of the LU Interface Works. All site lighting shall be placed or screened by the *Contractor* so as not to interfere with any signal lights and Driver Only Operation (DOO) platform monitoring devices. Site lighting shall be positioned such that it does not affect the signal sighting or vision of train drivers or obscure

places of trackside safety. The *Contractor* shall also be aware of and take into account the presence of buried services when determining the position of lineside temporary lighting equipment. Red, yellow and green lights shall not be used where their meaning could be misinterpreted by train drivers. Flashing yellow lights may only be used on or about the existing Network with the acceptance of the *Project Manager*.

11.6.8.4 Security

Until the LU Interface Works have been completed, the *Contractor* shall provide and maintain all lights, guards, fencing and watchmen when and where necessary or reasonably required by LUL's Engineer or the *Project Manager* in connection with the LU Interface Works for the protection and security of the LU Interface Works and for the safety of the public, the employees or passengers of LUL and other persons on LUL Property and the Work Site.

The *Contractor* shall put in place an effective site security system for those Work Sites on or adjacent to the Underground Network to ensure the operating railway is not put at risk in any way by the presence of unauthorised persons (refer also to Works Information Volume 2B Part 16 Security). All Equipment and Plant and Materials shall be kept safe and secure when not in use and shall be located so as to avoid opportunity for trespass or vandalism on or directed against LUL Property.

11.6.8.5 Protection to Railway Equipment

The *Contractor* shall design, construct, maintain and remove on completion of the Works Package any temporary protection required to prevent damage to the tracks, signal and telecommunication equipment or contamination of track ballast.

11.6.8.6 Confined Spaces

A considerable number of confined spaces exist on or about the Underground Network. The *Contractor* shall comply fully with the requirements of the Confined Spaces Regulations 1997 and the Associated Code of Practice.

11.6.8.7 Clothing and Personal Protective Equipment

All persons engaged in the construction phase of the *works* must wear high visibility clothing of an approved colour, type and design (including retro-reflective strips) acceptable to LUL. The personnel protective clothing must be worn correctly and kept in a clean condition.

11.6.8.8 Removal of the *Contractor's* Employees

LUL may object to and require the immediate removal from the Site and/or the Working Areas of any person thereon who in the opinion of LUL is not in a fit condition to carry out their duties, or is liable to endanger their own health and safety or that of others. Such persons will not be permitted further access to the Work Site.

11.6.8.9 Registers and Certificates

All registers, site diaries and certificates relating to the Works Package being undertaken must be available for inspection by LUL at the relevant Site and/or Working Area or at such other location agreed with LUL.

11.6.8.10 Emergency Action

A detailed procedure for dealing with emergencies relating to the Work Site shall be produced by the *Contractor* in consultation with the *Project Manager* and LUL. This procedure shall be accepted in writing by LUL before work starts and shall be reviewed and updated as circumstances vary. Key actions shall be set out on a poster to be prominently displayed in locations to be agreed with LUL. These must include the method of stopping trains in the event of an incident that could affect the safety of trains and/or persons and, in the case of an electrified line, how to arrange to have the current switched off.

All staff and operatives shall be made fully conversant with this procedure. Auditable checks should be undertaken at intervals to be decided by LUL to monitor this understanding and evidence thereof shall be maintained on site and available for inspection by the *Project Manager* and LUL.

11.6.8.11 Rail Traffic During a Possession

During a Closure and Possession it may be necessary for engineer's trains and/or on-track machines to pass through the Work Site by prior arrangement. This will necessitate the temporary clearance of the railway track and cessation of those activities that could affect their passage or the safety of personnel on or near the line.

11.6.8.12 Materials

The *Contractor* shall not deposit on the Site and/or the Working Areas any Plant and Materials which are not required for the execution of the LU Interface Works.

On completion of any part of the LU Interface Works, the *Contractor* shall clear away and remove from the Site and/or the Working Areas all surplus construction equipment and temporary works of every kind and all waste material, which has been used in respect of or accumulated as a result of the LU Interface Works.

All materials to be used on LUL Property in connection with the LU Interface Works shall comply with Crossrail Standards Baseline governing the use and storage of materials.

11.6.9 Competency and Training of People

The *Contractor* shall be responsible for ensuring that all training and certification has been obtained prior to any works or access onto the Underground Network as stated within the LUL QUENSH standard and any Special Conditions for 'Outside Parties working on or near the Railway'. This must be achieved in a timely manner.

The minimum training requirement for access to the Underground Network is LUL induction training (Access Card). Depending on the nature of *LU Interface Works* required additional training may include, fire safety, track awareness, confined spaces, and emergency preparedness. N.B. To gain certain certificates and licenses a medical is required.

Contractors' staff presenting without the correct and current permits and licenses will be refused access to work on LUL Property.

11.6.10 Communications

The maintaining of good working relations with LUL is essential to the successful outcome of this contract. The *Employer* has agreed with LUL that to ensure a controlled approach to LUL-related matters all communications between the *Contractor* and LUL shall be through the *Project Manager* to LUCT except in the following circumstances:

- as a result of and during an emergency or security alert;
- when instructed by an authorised LUL representative to take action for safety reasons (in which case the *Contractor* shall advise the *Project Manager* immediately and in writing within 24 hours of the instruction giving details of the circumstances); and
- if directed otherwise by the *Project Manager*.

All agreements and/or approvals obtained from LUL and any instructions given by LUL shall not have any effect under this contract unless and until confirmed in writing by the *Project Manager*.

The *Contractor* shall:

- immediately notify the *Project Manager* and LUL's Engineer of all incidents requiring notification to any local or central government authority or statutory authority arising under the terms of health and safety legislation;
- ensure that a health and safety policy statement including details of hazards safety procedures and frequency of site inspections is issued for use of those engaged in the LU Interface Works; and
- ensure that LUL is kept advised of site inspections by any statutory authorities and is given reasonable advance notice of the same.

11.6.11 The *Contractor's* Records and Audits by LUL

The *Contractor* shall keep records of all documents relating to the LU Interface Works.

The *Contractor* shall allow LUL's representatives, the identity of whom shall be notified to the *Contractor* by the *Project Manager*, to inspect and audit at any time the records that he is required to keep.

The *Contractor* shall also provide access to LUL's representatives to work being done for the purpose of auditing the work in progress.

11.6.12 Protection of LUL Utilities

A number of 3rd party cables and assets exist on the Underground Network. Service Provider contractors (including LUL PFI) are responsible for their operation and maintenance. Telecommunications systems including those used by the Emergency Services, e.g. British Transport Police (BTP) and London Fire and Emergency Planning Authority (LFEPA) and systems owned by third party telecommunications companies, use LUL infrastructure as a means of cable routing. The *Contractor* shall take adequate measures during the provision of the *works* to protect all existing cables and assets from damage.

11.7 Appendices

Appendix 11A	Closure Request Form (CRF) – Template and Sample
Appendix 11B	Application to Work Form (AWF) – Template and Sample
Appendix 11C	Access Request Form (ARF) – Template and Sample
Appendix 11D	Frustrated Access Forms TfL LUL Nominee BCV Limited / LUL Nominee SSL Limited (Ref. MR-F-31507 V2 25/6/2009) Tube Lines Limited (Ref. TLF-410)
Appendix 11E	QUENSH Menu.
Appendix 11F	Work Package Plan (WPP) Template
Appendix 11G	Execution Plan (EP) Template
Appendix 11H	Access Code
Appendix 11J	Infrastructure Protection Plan (IPP)

Part 12 – Docklands Light Railway Interface

12.1 Introduction

This part of the Works Information applies to any part of the *works* constituting Docklands Light Railway (DLR) Replacement Works and/or DLR Interface Works. It further describes the *Contractor's* obligations in respect of the ATC System Works that are completed by Others.

Docklands Light Railway Limited (DLR), as the controller of the Docklands Light Railway, has: -

- a duty to provide and maintain a safe railway;
- a duty to provide a specified level of service to its customers, and
- through its agreements with other organisations, a duty to liaise with those organisations to avoid disruption to the DLR Network during prescribed periods during the Project.

The Project has many interfaces with the existing Docklands Light Railway at various locations along its route. Consequently its construction will impact upon the existing Docklands Light Railway infrastructure with the potential for disruption to the operational Docklands Light Railway.

Any disruption planned or otherwise, to the Docklands Light Railway caused by the *works* may result in the payment of compensation and costs to DLR by the *Employer* and recovery by the *Employer* from the *Contractor*.

The *Employer*, during the construction of the Programme, is committed to ensuring the continued safe operation of the Docklands Railway and to minimising any disruption to DLR operations.

The *Employer* has entered into an agreement with DLR (the “Works Agreement”) to facilitate the undertaking of those parts of the *works* which:

- replace DLR assets on the planned alignment of the Project (the “DLR Replacement Works”);
- are located over, under, alongside or on the Docklands Railway which DLR determines might reasonably affect the safety and operation of the Docklands Light Railway (the “DLR Interface Works”); and
- require modification of the ATC System to take account of the Replacement Works (the “ATC System Works”)

The Works Agreement defines the processes to be followed for works that have the potential to affect existing DLR assets, for example through ground movement caused by construction activities.

12.2 Technical and Defined Terms

Technical and defined terms used in this part of the Works Information shall have the meaning given in the Glossary.

12.3 The Docklands Light Railway Replacement Works (DLR Replacement Works)

The DLR Replacement Works that form part of the *works* are listed in Volume 2A of the Works Information.

12.4 The Docklands Light Railway Interface Works (DLR Interface Works)

Certain DLR Interface Works that form part of the *works* and have been identified by the *Employer* during the development of the design are listed in Volume 2A of the Works Information.

The DLR Interface Works identified by the *Employer* may not be exhaustive of all the DLR Interface Works required to Provide the Works. Dependent on the *Contractor's* plans to construct the *works* and in particular the nature and extent of any temporary works it may elect to use, there may be other parts of the *works* that have the potential to affect the stability, safety, maintenance or operation of the Railway and therefore constitute DLR Interface Works.

Within 6 weeks of the *starting date*, the *Contractor* shall notify the *Project Manager* of any parts of the *works* and/or Temporary Works which he considers may constitute DLR Interface Works but which have not been identified in Volume 2A of the Works Information. The *Contractor's* notification shall include an explanation, supported if necessary by drawings and other relevant information, as to why the part of the *works* and/or Temporary Works notified may constitute DLR Interface Works.

Upon receipt of the *Contractor's* notification, the *Project Manager* shall review and submit the above information to DLR to enable them to determine whether such works are DLR Interface Works.

The *Project Manager* shall communicate DLR's decision to the *Contractor*. If DLR confirms that the part of the *works* is DLR Interface Works then the requirements of sections 12.6 and 12.7 of this part of the Works Information shall apply to that part of the *works*.

12.5 The ATC System Works

DLR will be responsible for procuring the design, manufacture, supply, installation, commissioning, testing and completion of the ATC System Works.

Volume 2A of the Works Information also identifies the ATC System Works that are required in order to facilitate or as a result of the Replacement Works.

The ATC System Works Contractor will complete the ATC System Works for DLR.

12.6 The *Employer's* Responsibilities for the Railway Interface

12.6.1 The Works Agreement

The Works Agreement imposes on the *Employer* and DLR, a duty to co-operate in the planning and development of the DLR Replacement Works and DLR Interface Works. This includes the utilisation of Possessions to facilitate both the safe and efficient implementation of the DLR Replacement Works and DLR Interface Works and the safe and efficient operation of the Railway.

The *Contractor* will not be permitted to carry out any DLR Replacement Works and/or DLR Interface Works without the *Project Manager* having first obtained DLR approval.

12.6.2 Railway Interface Coordination

In order to facilitate and co-ordinate the work of the *Employer* across the whole of the Project and maintain a consistent approach to the Docklands Light Railway interface, the *Project Manager*, acting on behalf of the *Employer*, will coordinate and manage the strategic aspects of the DLR Replacement Works and DLR Interface Works.

The *Contractor* shall be responsible for the timely provision of all necessary information and shall consult and liaise with the *Project Manager* at all stages during the preparation of the information required to support the *Project Manager's* technical submissions and applications to DLR for Possessions.

The *Project Manager* shall:

- Obtain responses and act as the *Contractor's* focal point for any Railway related queries;
- facilitate direct communication where appropriate between the *Contractor* and DLR and subject to such requirements as may be directed to enable the *Project Manager* to retain full visibility of such communications;
- review the information prepared by the *Contractor* in support of the *Project Manager's* technical submissions and Possession Schedule arrangements for completeness and clarity;

- routinely monitor the *Contractor's* progress with the preparation of the information required in support of technical submissions and Possession Schedule arrangements;
- routinely monitor the *Contractor's* co-ordination with the work of Others insofar as it relates to the Railway interface;
- maintain an integrated works programme for all DLR Replacement Works and DLR Interface Works; and
- issue instructions relating to the DLR Replacement Works and DLR Interface Works and all requirements of DLR.

The *Project Manager* in consultation with the *Contractor* shall liaise with DLR on a regular basis and shall maintain an up to date schedule detailing the status of all submissions made or to be made to DLR.

For the avoidance of doubt, the appointment of the *Project Manager* to provide co-ordination with DLR does not diminish the *Contractor's* responsibility to Provide the Works and/or provide any information required by the *Project Manager* in support of technical submissions and/or Possession applications.

12.7 The *Contractor's* Main Responsibilities

12.7.1 General

At a time to be agreed between the *Project Manager* and the *Contractor*, having due regard to the commencement date of the DLR Replacement Works and DLR Interface Works, the *Project Manager* in consultation with the *Contractor* shall prepare for the Replacement Works and Interface Works, submissions to DLR for their approval using the review procedure described in clause 12.7.2 below.

The *Contractor* shall include in its programme for acceptance the proposed dates for:

- the submission of *Contractor* designed elements of the DLR Replacement Works and method statements for the implementation of the DLR Replacement Works and the date on which approval is required;
- the submission of Protective Measures Assurance Statements for DLR Interface Works and method statements for the implementation of the DLR Interface Works and the date on which approval is required;
- the submission and maintenance of the Possession Schedule;
- the undertaking of any survey works;
- the production and agreement of *works* inspection and testing plans;

- in respect of DLR Replacement Works only, the production and agreement of a handover strategy (to DLR) including a testing and commissioning plan;
- all critical path activities in connection with the DLR Replacement Works and DLR Interface Works; and
- the order and timing of any works to be completed by the ATC System Works Contractor.

12.7.2 Technical Submissions

The Works Agreement requires the *Employer* and DLR to make various submissions to each other for agreement and/or approval. The *Employer* via the *Project Manager* will transmit submissions from the *Contractor* that are required to Provide the Works to DLR. The *Contractor* produces and compiles the submissions to DLR required to Provide the Works and submits these to the *Project Manager* for acceptance.

The approval process will require DLR to state that it either has "no objection" or "objections" to the submission. In the event that DLR has "objections" to the submission prepared by the *Contractor*, the *Contractor* shall amend the submission and re-submit it to the *Project Manager* for acceptance.

The *Contractor* shall submit each technical submission to the *Project Manager* no later than 12 weeks prior to the *Contractor* requiring approval to proceed. Where a combination of technical submissions will be required (as is the case with Protective Measures Assurance Statements), the *Contractor* shall commence the submissions process allowing sufficient time for approval of the final submission prior to commencing the related part of the *works*.

The *Contractor* shall produce the following technical submissions for approval by DLR:

- drawings, specifications and technical assurance documentation for *Contractor* designed elements of the DLR Replacement Works;
- Protective Measures Assurance Statements for DLR Interface Works;
- Method statements for DLR Replacement Works and DLR Interface Works;
- a Possession Schedule detailing all Possessions required in order to Provide the Works;
- a handover strategy for the completed DLR Replacement Works; and
- other documentation reasonably required by DLR in order to review the *Contractor's* technical submissions.

12.7.2.1 Contractor Designed Elements of the Replacement Works

The *Contractor* shall submit drawings, specifications and technical assurance documentation to the *Project Manager* for acceptance in accordance with Part 7 - *Contractor Designed Works* of Volume 2B of the Works Information.

12.7.2.2 Protective Measures Assurance Statements

A three stage process of providing assurance statements will be followed to establish the scope of the Protective Measures for each of the DLR Interface Works locations. The assurance statements required are:

- Technical Interface Statement
- Design Interface Statement
- Construction Interface Statement

For identified DLR Interface Works the *Project Manager* may have commenced the process of submitting the assurance statements to DLR. Where this process has commenced the statements already produced are included in Volume 2A of the Works Information. The *Contractor* shall adopt these statements and complete the process of submissions.

The development of these Protective Measures Assurance Statements shall be without prejudice to the *Contractor's* general obligation to comply with DLR Standards and Procedures, in particular the Working on the Railway Manual.

12.7.2.2.1 Technical Interface Statement

The *Contractor* shall prepare an outline assessment of the impact of the DLR Interface Works on the operation of the Railway. The *Contractor* shall produce a Technical Interface Statement for each DLR Interface Works location. Each Technical Interface Statement will comprise (but not necessarily be limited to) the following:

- the DLR Interface Works location;
- identification of existing DLR assets affected;
- the scope of DLR Interface Works;
- a programme of DLR Interface Works activities;
- the scope of the interface;
- the potential impact on DLR assets;
- an indication of the required Protective Measures; and

- a statement as to whether the *Contractor* intends to produce a settlement and stability analysis and/or DLR Interface Works designs as part of the Design Interface Statement and, if so, a further statement on the *Contractor's* proposed technical methodology for undertaking such settlement and stability analysis.

The *Contractor* shall submit each Technical Interface Statement to the *Project Manager* for acceptance.

12.7.2.2 Design Interface Statement

In this stage the *Contractor* will prepare a Design Interface Statement for each DLR Interface Works location. This will be developed from the relevant Technical Interface Statement and include:

- a risk assessment;
- DLR Interface Works designs (if required in accordance with the Technical Interface Statement which has been approved by DLR);
- outline Protective Measures;
- a settlement and stability analysis including a report on the anticipated impact of the Interface Works on DLR Property and the design of any ground movement and other monitoring measures (if required in accordance with the Technical Interface Statement which has been approved by DLR); and
- a statement as to whether the *Contractor* intends to produce an updated risk assessment and/or temporary works designs as part of the Construction Interface Statement.

The *Contractor* shall submit each Design Interface Statement to the *Project Manager* for acceptance. The *Project Manager* will submit the accepted Technical Interface Statement to DLR for approval. A reason for not accepting the proposed Design Interface Statement is that it has not been approved by DLR.

12.7.2.3 Construction Interface Statement

In this stage the *Contractor* will prepare a Construction Interface Statement for each DLR Interface Works location. This will be developed from the Design Interface Statement and include:

- an updated risk assessment (if required in accordance with the Design Interface Statement which has been approved by DLR);
- a method statement;
- temporary works designs (if required in accordance with the Design Interface Statement which has been approved by DLR);
- detailed Protective Measures;

- contingency plans (including in respect of any ground movement or settlement); and
- ongoing ground movement and other monitoring measures.

The *Contractor* shall submit each Construction Interface Statement to the *Project Manager* for acceptance. The *Project Manager* will submit the accepted Construction Interface Statement to DLR for approval. A reason for not accepting the proposed Construction Interface Statement is that it has not been approved by DLR.

12.7.2.3 Method Statements

The *Contractor* shall develop statements detailing the method of providing:

- each part of the DLR Replacement Works;
- any DLR Interface Works, in sufficient detail to comply with the *Contractor's* obligations in respect of Protective Measures identified in production of Protective Measures Assurance Statements; and
- any access requested by the *Contractor* in accordance with the granting of any access without Possession.

The *Contractor* shall develop the method statements on an ongoing basis and shall be responsible for submitting each method statement to the *Project Manager* for acceptance in sufficient time in advance of the programmed date for the commencement of the relevant works allowing for approval by DLR.

Each method statement submitted by the *Contractor* for acceptance shall:

- contain sufficient detail and, where applicable, be in the form required in accordance with the Working on the Railway Manual;
- be accompanied by sufficient information to enable DLR to assess whether it has any grounds for objection; and
- contain enough information to enable adequate safety, protection and supervisory activities to be planned, organised and implemented.

12.7.3 Carrying Out The DLR Replacement Works or DLR Interface Works

Before any of the DLR Replacement Works or DLR Interface Works may proceed, the *Employer* needs to satisfy DLR via technical submissions including method statements and Protective Measures Assurance Statements that the DLR Replacement or DLR Interface Works shall be carried out in such a manner that:

- the safe operation of the Railway is ensured at all times;
- the *works* shall be technically adequate for their purpose (unless DLR has elected to produce plans in relation to the design thereof); and

- any disruption to the Railway is, as far as possible, planned well in advance and is minimised.

Consistent with obtaining DLR approval to proceed with the Replacement Works and Interface Works, the *Contractor's* main responsibilities are as follows:

- to appoint a Railway Interface Manager who is a *key person* and who shall be responsible for the management, co-ordination, delivery and control of the *Contractor's* activities relating to the Railway interface;
- in respect of consents and approvals for the DLR Replacement Works and/or DLR Interface Works:
 - to notify the *Project Manager* of all consents and approvals required;
 - to show on the Accepted Programme when such consents and approvals are likely to be required;
 - provide any assistance and supporting information which the *Project Manager* may require in relation to obtaining, maintaining and complying with all such consents and approvals
- to ascertain and provide all information to the *Project Manager* which the *Employer* requires in support of technical submissions and to comply with the procedures for arranging and implementing Possessions;
- to ascertain when all such submissions and applications need to be submitted to allow time for acceptance by the *Project Manager* and review by DLR and, if appropriate, revise and re-submit;
- to show on all programmes submitted to the *Project Manager* for acceptance the order and timing of all activities in connection with the technical submissions and Possession Schedule;
- to seek preliminary guidance from DLR, where appropriate, regarding the form, content and timing of all submissions and applications and of any constraints which may impact upon the DLR Replacement Works and/or DLR Interface Works;
- to design (to the extent that the *Contractor* is responsible for the design of the DLR Replacement Works), procure and carry out the Replacement Works in accordance with:
 - all legal requirements;
 - all relevant DLR Standards and Procedures;
 - all other relevant current British, European and international codes and standards contained in the Crossrail Standards Baseline;

- the materials and workmanship specifications contained elsewhere in this Works Information;
 - all consents and any conditions attached thereto; and
 - such other conditions as DLR may consider necessary relating to the efficiency and safety of the Docklands Light Railway.
- at the *Project Manager's* request, to attend meetings with the *Project Manager*, the *Employer* and/or DLR during the design and/or construction of the DLR Replacement Works and/or DLR Interface Works;
 - provide information to the *Project Manager* to allow preparation of progress reports to DLR;
 - make available to the *Project Manager*, *Employer* and DLR any data or information (including technical, programming, planning and environmental information) which is in the *Contractor's* possession or control in respect of the works which, acting reasonably, the *Contractor* believes *Project Manager*, *Employer* and/or DLR may require in connection with:
 - the operation of the Railway;
 - the implementation of the DLR Interface Works;
 - the implementation of the DLR Replacement Works; or
 - the implementation of the ATC System Works.
 - to provide information to the *Project Manager* which the *Employer* requires to satisfy DLR that during the construction of the DLR Replacement Works or DLR Interface Works the continued safe operation of the Docklands Light Railway is ensured at all times;
 - to comply with the particular working constraints and requirements applicable to the control of access to the Docklands Light Railway and necessary to ensure the continued safe operation of the Docklands Light Railway during the construction of the DLR Replacement Works or DLR Interface Works;
 - to take all steps to ensure that the DLR Replacement Works and DLR Interface Works are carried out to minimise disruption to the Docklands Light Railway and any third party using or with an interest in any part of the Docklands Light Railway or any other land and buildings affected by the DLR Replacement Works and DLR Interface Works;
 - not commence construction of any element of any part of the DLR Replacement Works until the *Project Manager* has notified the *Contractor* that all planning and other consents which could impose conditions on or otherwise impact on the design or construction of that part of the DLR Replacement Works have been obtained;

- construct , commission, integrate and complete the DLR Replacement Works:
 - to meet the detailed design which has been approved by DLR;
 - in compliance with the Method Statements approved by DLR;
 - in compliance with the DLR Standards and Procedures;
 - in compliance with the Olympics Mitigation Measures;
 - in accordance with all applicable legal requirements; and
 - in accordance with any additional constraints identified in Volume 2A of the Works Information.
- design and construct the DLR Interface Works:
 - in compliance with the Protective Measure Assurance Statements which have been approved by DLR;
 - in compliance with the Method Statements approved DLR;
 - in compliance with the DLR Standards and Procedures to the extent that they are applicable to the Interface Works;
 - in compliance with the Olympics Mitigation Measures;
 - in accordance with all applicable legal requirements; and
 - in accordance with any additional constraints identified in Volume 2A of the Works Information.
- notify the *Project Manager* so notice can be given to DLR when the *Contractor* believes it has completed the DLR Replacement Works and/or DLR Interface Works in accordance with this contract.

In the event that the *Contractor* fails to comply with the technical submissions approved by DLR, the *Project Manager* may be obliged to suspend the relevant works until such time the *Contractor* has remedied the non-compliance.

12.7.4 Rectification of Damage and Correction of Defects

12.7.4.1 Rectification of Damage

If in constructing the DLR Replacement Works or DLR Interface Works the *Contractor* causes any damage to DLR assets or property (other than any damage which is contemplated by the relevant design, protective measures assurance statement or method statement which has been endorsed "no objection" in accordance with this Works Information), the *Contractor* shall immediately notify the *Project Manager* and DLR. The *Project Manager* may instruct the *Contractor* to rectify such damage.

Upon receipt of the *Project Manager's* instruction, the *Contractor* shall make good such damage as soon as practicable. In carrying out the rectification works, the *Contractor* shall use all reasonable endeavours to request access only if it believes that such access will not prevent, impair or otherwise affect the ability of DLR to operate train services on the Railway or during an Engineering Hours Possession so as to minimise the interference with the operation of the Docklands Light Railway. If it is agreed that DLR should carry out the rectification works, then DLR will be entitled to recover all costs incurred by reason of any such damage. Where the DLR asset or property which has been damaged will be replaced as part of the DLR Replacement Works, then rectification will only be required to the extent necessary to ensure safe operation of the Docklands Light Railway up until the date on which the DLR Replacement Works become operational.

12.7.4.2 Correction of Defects

Without limiting the *Contractor's* liabilities in respect of the notification and correction of Defects in the *works*, where DLR discovers a Defect in the DLR Replacement Works or DLR Interface Works which it reasonably considers prevents safe operation of any part of the Docklands Light Railway and therefore requires immediate rectification, DLR may, where practical and after consultation with the *Employer*, carry out any required Defect correction works in accordance with the Works Agreement.

If DLR carries out the Defect correction works, then DLR will be entitled to recover all costs incurred.

12.7.5 Docklands Light Railway Possessions

12.7.5.1 General

Possessions may be required in order to carry out parts of the works including:

- pre-construction surveys, monitoring and post construction surveys;
- the construction, commissioning and integration of certain Replacement Works; and
- the construction of certain Interface Works.

Any Possession constitutes disruption to the Docklands Light Railway and consequently their use is to be avoided unless absolutely necessary to Provide the Works. If the need for Possessions cannot be avoided then they shall only be carried out on dates and at times agreed with DLR.

If a Possession of the Docklands Light Railway is required in order to carry out the DLR Replacement Works or DLR Interface Works, the *Project Manager* with the assistance of the *Contractor* shall consult with DLR regarding the availability of Possessions.

Where the use of Possessions is unavoidable, the Contractor shall follow DLR's Possessions Application Procedure to ensure such use is planned well in advance to minimise the disruption caused to the Docklands Light Railway.

In order to comply with DLR's planning horizons for the arrangement of Possessions, the *Employer* has already confirmed ("booked") those Possessions identified as such in the Possession Schedule in Volume 2A of the Works Information.

The *Contractor* must further develop and submit to the *Project Manager* the Possession Schedule in Volume 2A to provide a Possession Schedule that identifies those Possessions which the *Contractor* considers are necessary in order to Provide the Works in accordance with his programme. The Possession Schedule shall be accompanied by a report which sets out in respect of each Possession:

- details of the nature and scope of the works to be carried out during the relevant Possession;
- an explanation of why the Possession is required (including, in the case of any Weekend Possession or Bank Holiday Possession, an explanation of why it anticipates the relevant works cannot be carried out in an Engineering Hours Possession); and
- in the case of a Possession relating to Interface Works, an explanation of why there is no other reasonably practical means of construction of the works without requiring a Possession.

For the avoidance of doubt the Possession Schedule after acceptance by the *Project Manager* will form part of the Works Information and consequently:

- the Possessions identified within the contract Possession Schedule represent a constraint on how the *Contractor* Provides the Works;
- the *Contractor* has a duty to Provide the Works in accordance with the Possession Schedule; and
- no information contained within the Possession Schedule may be changed other than by an instruction given by the *Project Manager*. The *Contractor* shall show on all programmes submitted to the *Project Manager* for acceptance, the order and timing of all Possessions he plans to use to Provide the Works.

12.7.5.2 Confirming Docklands Light Railway Possessions

For those Possessions included in the Possession Schedule which have not already been booked, the *Contractor* shall, by the date indicated in the Possession Schedule, notify the *Project Manager* whether he still requires the relevant Possession in order to Provide the Works. If the *Contractor* no longer requires the Possession his notification shall include an explanation justifying why the *Contractor* considers the Possession is no longer required.

Upon receiving the *Contractor's* confirmation that the Possession is required, the *Project Manager* shall proceed to book the relevant Possession.

The *Project Manager* shall notify the *Contractor* when he receives DLR acceptance to the Possession. If DLR does not accept the Possession requested, the *Project*

Manager, after consultation with DLR, will instruct any necessary changes to the Possession Schedule.

The *Contractor* familiarises itself with the DLR planning process and will be required to provide requisite documentation and representatives at the relevant planning meetings as necessary to support the approval and management of all Possessions.

12.7.5.3 Changes to the Possession Schedule

The Possession Schedule identifies those Railway Possessions that are considered necessary in order to Provide the Works and therefore represents the minimum practicable level of disruption to Railway operations.

Consequently, changes to the Possession Schedule are discouraged unless such changes reduce further the amount of disruption caused by the *works* to DLR operations.

The *Contractor* upon becoming aware, for whatever reason, that a change to the Possession Schedule is necessary in order to Provide the Works, shall notify the *Project Manager* using the Possession Change Request Form identified in Appendix 12A.

To increase the likelihood of changes to the Possession Schedule being acceptable to DLR, the *Contractor* should be aware of the following general constraints regarding the availability and use of Possessions. The *Contractor* shall:

- not request any Possession other than Engineering Hours Possessions, Weekend Possessions or Bank Holiday Possessions;
- plan the *works* to allow the use of primarily Engineering Hours Possessions;
- plan the works to use Possessions already planned by DLR; and
- avoid Planned Public Events.

To maximise the time available to consult with the DLR and for the pre-planning and co-ordination of Possessions across the Docklands Light Railway, the *Contractor* shall where practicable, notify the *Project Manager* of a proposed change to the Possession Schedule no later than 13 weeks before the planned possession.

Any notification from the *Contractor* of a change to the Possession Schedule shall be accompanied by the appropriate technical submissions necessary to satisfy DLR that the continued safe operation of the Railway is protected.

A change to the Possession Schedule is only confirmed when the *Project Manager* notifies the *Contractor* of DLR acceptance by giving an instruction changing the Possession Schedule.

12.7.5.4 Possession Management Meetings

As part of the Possession management process, the *Contractor* shall be required to attend the relevant planning meetings with DLR with the objective of satisfying DLR

that the DLR Replacement Works and DLR Interface Works shall be carried out in a safe and efficient manner. The *Project Manager* will advise the *Contractor* the details of all such meetings.

12.7.5.5 Access Without Possession

The *Contractor* may be granted access to the Railway without the need for a Possession where DLR considers that access will not prevent, impair or otherwise affect the ability of DLR to operate services on the Railway. In such circumstances the *Contractor* shall submit a notification to the *Project Manager* using the template in Appendix 12B and the *Project Manager* will seek DLR approval. The *Contractor's* notification shall include a method statement for the relevant works that identifies the dates on which access is required.

When accessing the Docklands Light Railway without a Possession, the *Contractor* shall:

- comply with the method statement approved by DLR;
- adhere to the DLR operational health and safety requirements; and
- repair any damage to the Docklands Light Railway caused by the *works*.

12.7.5.6 Possession Charges and Damages for Late Hand Back

The *Employer* will provide any Possession granted by DLR in accordance with the requirements of this contract at no cost to the *Contractor*.

In the event that the *Contractor* hands back any part or section of the Docklands Light Railway late following a Possession or the *Contractor* fails to book a Possession in accordance with the requirements of this contract, DLR is entitled to claim damages from the *Employer*. These damages are calculated in accordance with Appendix 12C and may be recovered by the *Employer* from the *Contractor*.

12.7.6 Interface with DLR Contractors

The *Contractor* shall cooperate and coordinate the *works* with the works of DLR contractors to the extent that is necessary to Provide the Works in a safe and efficient manner and minimise the disruption to the Railway.

The *Contractor* shall provide DLR contractors with access to the working areas, including those sites provided as part of a Possession, which is reasonably required for them to complete their works.

The *Contractor* shall attend regular meetings with DLR contractors and record the actions arising therefrom.

12.8 Docklands Light Railway Requirements

12.8.1 General

This part of the Works Information sets out the requirements with which the *Contractor* shall comply when carrying out the DLR Replacement Works and DLR Interface Works.

12.8.2 DLRL Standards and Procedures

The *Contractor* shall comply with all relevant DLR Standards and Procedures when Providing the Works.

The *Contractor* shall put in place a system in order that he becomes aware of the publication by DLR of any revisions to the DLR Standards and Procedures current at the contract date. the *Contractor* shall, before implementing any such revision, give an early warning to the *Project Manager* by notifying him in accordance with Clause 16.1 of the *conditions of contract*.

The *Project Manager* upon receipt of the *Contractor's* notification shall instruct the *Contractor* either to comply with the revised DLR Standards and Procedures or, to ignore the revision pending the *Employer's* application for a derogation.

12.8.3 CDM Regulations

For the purpose of undertaking any of the Replacement Works and Interface Works, the *Contractor* shall act as the Principal Contractor for the purpose of the CDM Regulations unless notified otherwise by the *Project Manager*. Such a notification is only likely to be given in the event of joint occupation by the *Contractor* and Others of the same part of the Docklands Light Railway.

The *Contractor* shall provide information as necessary to allow compilation of the Health and Safety File . The *Contractor* may be required to produce this information in parts to suit the handover of the DLR Replacement Works and DLR Interface Works to DLR.

12.8.4 Subcontractors

The *Contractor* shall only appoint subcontractors (and ensure that subcontractors only employ subsubcontractors) who are on the list of contractors approved by DLR for carrying out works on the Docklands Light Railway.

12.8.5 Docklands Light Railway's Particular Health and Safety Requirements

Without limiting the *Contractor's* obligations as Principal Contractor under the CDM Regulations, the *Contractor* shall be responsible for health and safety for the DLR Replacement Works and DLR Interface Works, and DLR shall be responsible for health and safety of the ATC System Works.

The *Contractor* shall employ an appropriate and effective safety management system which shall include one or more suitably qualified, trained and experienced

persons to be responsible for all safety matters associated with the DLR Replacement Works and DLR Interface Works, including the following aspects:

- the timely consultation with the DLR safety representative and all relevant regulatory authorities on safety matters relevant to the various construction methods and the Site and/or the Working Areas including sites made available under any Possession;
- where appropriate developing and promulgating safety procedures, with the DLR safety representative and agreeing these with the relevant regulatory authorities;
- defining specific measures for particular activities, jobs and sites, producing method statements on safety aspects;
- producing safety documentation in consultation with the DLR Safety Representative;
- defining and reporting on tests and trails needed to demonstrate safety;
- performing safety analyses and quantified risk assessments;
- reporting on safety matters and accident statistics to DLR, relevant regulatory authorities, the holder of any safety certificate or any “infrastructure manager” (as defined under ROGS) as appropriate;
- training construction personnel (including Subcontractor’s staff) on all safety matters;
- performing safety inspections, audit and spot checks on its own and Subcontractors’ personnel;
- taking appropriate actions on discovery of breaches of safety procedures; and
- establishing a suitable safety management regime including attendance to all DLR safety meetings and the preparation and monitoring of an annual safety plan.

The *Contractor’s* safety representative(s) shall, as far as reasonably possible, be independent of other functions within the *Contractor’s* organisation and shall have sufficient authority to ensure that safety requirements are complied with by all of the *Contractor’s* and its subcontractor’s employees. Such person(s) shall work closely with and co-ordinate all of the above duties and activities with the DLR safety representative. The *Contractor* shall give the DLR Safety Representative advanced notice of all meetings arranged pursuant to the above requirements.

12.8.6 Occupational Hazards in the Railway Environment

Contamination in various forms is common within the railway environment due to various historical activities. Areas previously used for railway depots and sidings have been particularly affected. When developing the the construction phase plan

(as defined in the Construction (Design and Management) Regulations 2007) and associated safe systems of work, the *Contractor* shall be aware of those areas where contamination is most likely and shall include provision for managing the risks associated with working near to or handling contaminated material. Works Information Volume 2B Part 19 Health and Safety Management sets out the necessary precautions to be taken and the reporting procedures to be followed if contamination is found.

In addition to the obvious hazard represented by moving trains, the *Contractor's* attention is drawn to the following hazards for which he shall put in place adequate mitigation measures to reduce, eliminate or control the risks arising therefrom. Although the Docklands Light Railway has been constructed to modern railway standards, parts of the railway have been constructed on redundant or adjacent to existing railway infrastructure so these risks remain current.

12.8.6.1 Human Excrement

Railway lines may have been previously used by or run adjacent to railway lines used by trains which are not fitted with controlled emission toilets. There may consequently be a risk of infection from discharged human excrement.

12.8.6.2 Asbestos

The use of asbestos (in all its various forms) has been extensive throughout the railway industry in previous years.

12.8.6.3 Lead

Protective and decorative coatings containing substantial quantities of lead may have been used on railway bridges, structures and buildings and this should be assumed unless testing shows otherwise. The presence of lead cables and cabling should also be assumed.

12.8.6.4 Cadmium

Cadmium may have been used as an anti-corrosion plating on some metal products on or about the railway.

12.8.6.5 Anthrax

The presence of anthrax spores has been detected on or about the railway.

12.8.6.6 Leptospirosis

There may be a risk of leptospirosis (Weils disease) as a result of contamination by rats.

12.8.6.7 Electricity

A major hazard within the railway environment is the extensive and varying number of electrical plant installations and electrical distribution systems. Low, medium and high voltages, AC and DC supplies, from high voltage sub-stations and feeder stations down to localised domestic supply levels can be expected. The *Contractor*

shall regard the presence of any train traction supply system, as particularly hazardous.

Warning notices acceptable to DLR shall be erected in prominent positions agreed by DLR.

All requirements as advised by DLR as to the earthing and bonding (or electrical segregation) of metalwork and foil covered sheet materials shall be complied with.

Further robust procedures shall be established and maintained to ensure safe access for all persons to the Dockland Railway and safe working practices where train traction supply systems are present. These procedures must be submitted to the *Project Manager* for acceptance prior to the relevant DLR Replacement Works and DLR Interface Works being undertaken.

12.8.7 Access to the Docklands Light Railway For Docklands Light Railway Limited Staff

The *Contractor* shall provide access for DLR to the Railway at all times (24 hours a day, 7 days a week) for the purpose of maintenance and repairs. Such access may be required at less than one hours notice.

If any item or issue disclosed to DLR in any progress report gives DLR reasonable cause for concern that any protective measures necessary in order to protect against any material damage to DLR assets or any other interference with the operation of the Railway are not being properly carried out, then DLR shall be entitled to enter the relevant part of the sites, including sites or Working Areas outside of the Railway in order to inspect, test and view the state and progress of such protective measures.

DLR will only be entitled to enter sites or Working Areas outside of the Railway with the prior consent of the *Contractor*. It will not be unreasonable for the *Contractor* to withhold consent if in the opinion of the *Contractor* it would be unsafe to allow access to DLR personnel. Upon any notification that DLR is to enter the worksites, the *Contractor* shall notify the *Employer* if it believes it would be unsafe to allow such access to DLR personnel stating its reasons for such belief.

12.8.8 Access to the Docklands Light Railway For The *Contractor*

Where the *Contractor* requires access to the Railway and such access will prevent, impair or otherwise affect the ability of DLR to operate train services on the Railway then the *Contractor* shall request a Possession as set out in the Working on the Railway Manual.

12.8.9 Construction Noise

The *Contractor* shall comply with the following requirements in respect of construction noise with regard to work on or near the operating railway:

12.8.9.1 Section 61 Consents

The *Contractor* shall submit applications under Section 61 of the Control of Pollution Act 1974 in accordance with Part 3 Planning, Environmental and Traffic Consents and Part 21 Environmental Management of Volume 2B of the Works Information. The *Contractor* shall copy his submission to the *Project Manager* and keep the *Project Manager* informed of any discussions on the submission and upon the approval of the submission.

12.8.9.2 Work at Night or on Sundays

When noisy operations are to be carried out at night or on Sunday, the *Contractor* shall ensure that all persons likely to be affected by such operations are suitably pre-warned.

12.8.9.3 Compliance with Standards

The *Contractor* shall comply with the general principles laid down in BS 5228 Noise Control of Construction and Open Sites or equivalent EC/ISO standard.

12.8.10 Site and/or Working Areas

The *Contractor* shall comply with the following requirements in respect of the Site and/or Working Areas necessary to provide the DLR Replacement Works and DLR Interface Works.

12.8.10.1 Site Representation

12.8.10.2 The *Contractor* shall appoint a full-time senior representative at the site during the execution of all DLR Replacement Works and DLR Interface Works. Prior to commencement of work on a site, the *Contractor* shall provide the *Project Manager* with a list of names and telephone numbers for personnel responsible for organising remedial action in the event of an emergency on the site when the site is unattended. Supervisory staff at the on site or in the Working Areas must have sufficient knowledge of English (both spoken and written) to understand and relay safety information, instructions and training to all personnel.

12.8.10.3 Screening, Fencing, Hoardings and Barriers

Any screening, fencing, hoarding and barriers on or adjacent to the Railway shall comply with the relevant DLR Standards and Procedures.

12.8.10.4 Site Lighting

All site lighting shall be placed or screened by the *Contractor* so as not to interfere with any signal lights or platform monitoring devices. Site lighting shall be positioned such that it does not affect the signal sighting or vision of train operators or obscure places of trackside safety. The *Contractor* shall also be aware of and take into account the presence of buried services when determining the position of lineside temporary lighting equipment. Red, yellow and green lights shall not be used where their meaning could be misinterpreted by train operators. Flashing yellow lights may only be used on or about the Docklands Railway with the agreement of the *Project Manager*.

12.8.10.5 Security

The *Contractor* shall put in place an effective site security system for those working areas on or adjacent to the Docklands Railway to ensure the operating railway is not put at risk in any way by the presence of unauthorised persons (refer also to Works Information Volume 2B Part 16 Security). All Equipment, Plant and Materials shall be kept safe and secure when not in use and shall be located so as to avoid opportunity for trespass or vandalism on or directed against the Docklands Railway.

12.8.10.6 Protection to Railway Equipment

The *Contractor* shall design, construct, maintain and remove on completion of the DLR Replacement Works and DLR Interface Works any temporary protection required to prevent damage to the tracks, signal and telecommunication equipment or contamination of track ballast.

12.8.10.7 Confined Spaces

A considerable number of confined spaces exist on or about the Docklands Railway. The *Contractor* shall comply fully with the requirements of the Confined Spaces Regulations

12.8.10.8 Clothing and Personal Protective Equipment

All persons engaged in the *works* must wear high visibility clothing of an approved colour, type and design (including retro-reflective strips) acceptable to DLR. The personnel protective clothing must be worn correctly and kept in a clean condition.

12.8.10.9 Removal of the *Contractor's* Employees

DLR may object to and require the immediate removal from the site and/or the Working Areas of any person thereon who in the opinion of DLR is not in a fit condition to carry out their duties, or is liable to endanger their own health and safety or that of others. Such persons will not be permitted further access to the site.

12.8.10.10 Registers and Certificates

All registers, site diaries and certificates relating to the DLR Replacement Works and/or DLR Interface Works being undertaken must be made available for inspection by DLR at the relevant site and/or Working Areas, or at such other location agreed with DLR.

12.8.10.11 Emergency Action

A detailed procedure for dealing with emergencies relating to the site and/or the Working Areas shall be produced by the *Contractor* in consultation with the *Project Manager* and DLR. This procedure shall be accepted in writing by DLR before work starts and shall be reviewed and updated as circumstances vary. Key actions shall be set out on a poster to be prominently displayed in locations to be agreed with DLR. These must include the method of stopping trains in the event of an incident that could affect the safety of trains and/or persons and, in the case of an electrified line, how to arrange to have the current switched off.

All staff and operatives shall be made fully conversant with this procedure. Auditable checks should be undertaken at intervals to be decided by DLR to monitor this understanding and evidence thereof shall be maintained on site and available for inspection by the *Project Manager* and DLR.

12.8.11 Competency and Training of People

The *Contractor* shall ensure, prior to any of his employees, subcontractors or suppliers working adjacent to, under, on, or above the Docklands Railway that they undergo the training and briefing requirements set out in the DLR Standards and Procedures and described below. This requirement is relevant to all *Contractor* sites located adjacent to the Docklands Railway.

In relation to the DLR Replacement Works and DLR Interface Works the *Contractor* shall employ and shall ensure that its subcontractors and suppliers employ only such persons as are properly qualified, experienced and competent to perform the work assigned to them.

Where any person employed by the *Contractor* (or their subcontractors) are engaged in any form of safety critical work, the *Contractor* shall ensure that the relevant requirements of the Railways and Other Guided Transport Systems (Safety) Regulations and Part 14 - Health and Safety Management of Volume 2B of the Works Information are complied with. Evidence that persons have been properly assessed as competent to perform their safety critical duties shall be provided to the *Project Manager*, if requested.

12.8.11.1 Induction Training

Familiarisation training in the characteristics of the Site must be given to the *Contractor's* employees and its Subcontractor's employees before commencement of any work and at agreed intervals during the progress of the *works*. Additional familiarisation training will be required if any of the Site characteristics change.

12.8.11.2 Fire Safety

Personnel shall receive specific instructions related to fire safety and undergo training commensurate with their duties and location.

12.8.11.3 Emergency Preparedness

An acceptable level of contingency and emergency preparedness training of staff is required.

12.8.11.4 Site Visitors

All visitors to the Site including DLR staff, shall be briefed, on the particular health and safety hazards of the Site. Records of all such briefings must be kept for audit purposes.

12.8.11.5 Confined Spaces

Training for entry into confined spaces may be necessary for certain activities.

12.8.12 Olympic Mitigation Measures

The Docklands Light Railway will be part of the strategic transport network used for transporting visitors to the London 2012 Olympic and Paralympic Games (the Olympic(s)) between the Olympic venues and transportation hubs. The Olympic Games will be held between 27 July 2012 and 12 August 2012 and Paralympic Games between 29 August 2012 and 9 September 2012 at venues in and around London.

The Olympic Mitigation Measures will include the following measures and restrictions:

- in respect of the 12 month period (July 2011 to July 2012) prior to the commencement of the Olympics during which DLR is required to assist with the testing of the Olympics transport plan, the Contractor shall not be entitled to any Possessions or carry out any activities which may affect the Docklands Light Railway which in DLR's opinion acting reasonably would interfere with its obligations in respect of testing of the Olympics transport plan;
- by no later than one month prior to the commencement of the Olympics, the Contractor shall ensure that each of the worksite used for the DLR Replacement Works and/or DLR Interface Works is in a condition which allows DLR to operate the Docklands Light Railway without any reduced capacity or any other restrictions and otherwise comply with the Olympics transport plan during the period of the Olympics;
- during the Olympics, the Contractor shall not be entitled to any Possessions or carry out any activity affecting the Docklands Light Railway which would interfere in any way with DLR's obligations in respect of the Olympics transport plan; and
- any other measures and restrictions affecting this contract included in Volume 2A of the Works Information.

DLR and the *Employer* will consult on further measures necessary to mitigate the impact of the DLR Replacement Works and DLR Interface Works on the operation of the Docklands Light Railway during the period leading up to and covering the duration of the Olympics. The *Project Manager* will instruct the Contractor on any further mitigation measures that affect the works.

12.9 Communications and Reporting

12.9.1 Communications

The maintaining of good working relations with DLR is essential to a successful outcome for the the Programme. For this reason and to ensure a controlled approach to Docklands Light Railway related matters all communications between the Contractor and DLR shall be through the *Project Manager* (refer 12.6.2) except in the following circumstances:

- during an emergency or security alert;
- to report accidents occurring on or affecting DLR assets;
- when requested by an authorised DLR representative to take action for safety reasons (in which case the *Contractor* shall communicate the request to the *Project Manager* immediately giving details of the circumstances); and
- if directed otherwise by the *Project Manager*.

12.9.2 Progress Reports

In addition to the periodic project reporting requirements described in Part 14 - Management and Administration of the Works of Volume 2B of the Works Information, the *Contractor* shall submit a four weekly progress report in respect of the Replacement Works and Interface Works to include:

- the progress of the DLR Replacement Works and DLR Interface Works against the *Contractor's* Accepted Programme and any milestones shown therein;
- a schedule of the *works* carried out during the relevant period;
- a schedule of the *works* to be carried out during the subsequent period;
- a record of all safety and environment related incidents or matters including the presence, release, disposal, escape, deposit, accumulation or storage of hazardous substances or waste occurring in the Working Areas associated with DLR Replacement Works and DLR Interface Works;
- all actual or potential issues of a material nature affecting the *Contractor's* accepted programme or the design or construction of the *works* impacting upon the operation of the Railway together with proposals for addressing such issues;
- all dealings with statutory authorities; and
- all dealings with the public and media organisations.

12.10 The *Contractor's* Records and Audits by Docklands Light Railway

The *Contractor* shall keep records of all documents relating to the DLR Scope Book Works including inter alia: -

- all health and safety documentation describing how the *Contractor* proposes to comply with DLR's particular health and safety requirements including the Health and Safety Plans and the Health and Safety Files required by the CDM Regulations;
- environmental and quality management plans, whether or not required in support of an Assurance Case;

- the *Contractor's* quality plan and quality procedures and evidence of the *Contractor's* compliance therewith;
- test and inspection plans and certificates ;
- method statements together with evidence of the *Contractor's* internal procedures for approval;
- details and records of the *Contractor's* permit to work system;
- details of the *Contractor's* system for the checking of temporary works design;
- detailed works programmes;
- risk registers and associated documentation; and
- competence assurance processes for people employed by the *Contractor*.

The *Contractor* shall allow DLR's representatives, the identity of whom shall be notified to the *Contractor* by the *Project Manager*, to inspect at any time the records that it is required to keep.

The *Contractor* shall also provide access to DLR's representatives to work being done for the purpose of auditing the work in progress.

12.11 Appendices

Appendix 12A Possession Change Request Template

Appendix 12B Access Without Possession Request Template

Appendix 12C Liquidated Damages for Late Handback of Possessions



Part 13 – Not Used

Learning Legacy Document

Part 14 – Management and Administration

14.1 Introduction

The Project requires the *Employer* and the *Project Manager* to deliver many contracts through a number of different contractors. In order to ensure a consistent approach towards the management and administration of the *works* such that information received from contractors is readily incorporated in the *Employer's* reporting and financial systems, the *Employer* has prescriptive requirements.

This part of the Works Information describes the *Employer's* requirements for the management and administration of the *works* by the *Contractor*.

In the case of the first submission of a deliverable, in this section, for the *Project Manager's* acceptance, the *Project Manager* replies within 4 weeks of the date of submission. Any further revisions, submissions and responses by the *Contractor* or *Project Manager* shall be made within the *period for reply*.

14.2 Project Management Requirements

14.2.1 Project Execution Plan

Within 4 weeks of the *starting date* the *Contractor* shall provide a Project Execution Plan for the *Project Manager's* acceptance.

The Project Execution Plan shall:

- describe how the *Contractor* plans to Provide the Works to achieve Completion on or before the Completion Date, within the forecast total of the Prices;
- describe, in the CDML provided as part of the Project Execution Plan, when the *Contractor* will provide the plans, procedures and other deliverables required by the Works Information to align with and support the Accepted Programme;
- describe the timing and frequency of the all meetings required by the Works Information;
- show how the *Contractor* will undertake the project controls and risk management requirements of the contract, including their planning and execution.
- After acceptance of the first Project Execution Plan by the *Project Manager* it shall be updated by the *Contractor* to reflect any required or proposed changes. Any updated Project Execution Plans are submitted to the *Project Manager* for acceptance.

14.2.2 Project Controls

The *Contractor* shall demonstrate in the Project Execution Plan:

- how he will comply with the project controls requirements of the contract. identify all procedures that are intended to form the *Contractor's* project controls system, together with the target dates for the issue of each procedure
- the deliverables, processes, tools and staffing requirements of these procedures;
- include all aspect of the *Contractor's* project controls functions such as estimating, cost control, planning / scheduling, earned value assessment, risk management, financial and progress reporting, and their automated systems, where applicable.

14.2.3 Risk Management

The *Contractor* shall demonstrate in the Project Execution Plan:

- how he will comply with the Risk Management requirements of the contract
- all documentation and procedures that are intended to form the *Contractor's* risk management system, together with the target dates for the issue of each and include the deliverables, processes, tools and staffing requirements of these procedures.

14.2.3A Procurement

The *Contractor* shall demonstrate in the Project Execution Plan:

- how he will comply with the Procurement requirements of this contract. all documentation, procedures and tools necessary to undertake his procurement.

14.2.4 Meetings

The *Contractor* and *Project Manager* shall have joint meetings which will include a review of progress, cost, performance, quality, risk and other issues arising. Other meetings shall be agreed between the *Contractor* and *Project Manager* as required.

As recorded in the Project Execution Plan, the *Contractor* and *Project Manager* shall agree the scope, frequency (weekly or 4 weekly), timing, chairman, minute takers and attendees for the joint meetings. The *Contractor* shall ensure its subcontractors attend meetings where relevant, and the *Project Manager* may invite others to the meetings where relevant. Meetings may be re-scheduled or additional meetings scheduled with the agreement of the *Project Manager*.

At a minimum, the *Contractor* shall attend the following joint meetings:

<u>Contract Meeting Schedule</u>	<u>Frequency</u>
Weekly Workplan Meeting	Weekly
Contract Four Weekly Progress Review with the <i>Project Manager</i> , including review of Four Weekly Dashboard Report	4 Weekly

14.3 Project Controls Requirements

14.3.1 Not Used

14.3.2 Not Used

14.3.3 Coding Structures

A series of coding structures have been developed for use on the Project for the purpose of summary reporting and cost/programme integration. The latest coding structures (Work Breakdown Structure, Code of Accounts, Programme Activity Codes, Resource Codes, etc.) will be supplied by the *Project Manager* within 2 weeks of the *starting date*. These coding structures shall be used by the *Contractor* for all project controls requirements unless agreed otherwise by the *Project Manager*. An indicative Work Breakdown Structure is included in Appendix 14A and Indicative Code of Accounts is included in Appendix 14B.

14.3.4 Not Used

14.3.5 Not Used

14.3.6 Project Controls Audits

The *Contractor's* project controls operations may be reviewed by the *Project Manager* to ensure that the individual procedures have been implemented and that together, these procedures provide for efficient and effective control of the contract. A plan of corrective actions shall be established between the *Contractor* and the *Project Manager* and then implemented. In addition, the audit provides a formal method of feedback in support of continuous improvement, including the development of enhancements.

The *Project Manager* reserves the right to undertake detailed audits of the *Contractor's* project controls systems until the *defects date*. The timing and frequency of audits shall be agreed between the *Contractor* and the *Project Manager* and noted in an audit plan. The *Contractor* shall make available staff as the *Project Manager* requires, enabling an effective and timely audit to be carried out.

At the completion of the audit, the *Project Manager* shall prepare a report summarising the results and conveying recommendations for areas that need improvement or enhancement. This will be a formal, constructive report intended to

help both the *Project Manager* and the *Contractor* in their efforts to effectively monitor and control the *works*. A plan for implementing any corrective actions identified shall be agreed between the *Contractor* and the *Project Manager*. Status against the action plan shall be reported by the *Contractor* on a 4 weekly basis until all the actions are closed out.

14.3.7 Cost Control and Reporting

14.3.7.1 Budget Control

The total of the Prices at the contract date will represent the original budget. The original budget revised for implemented compensation events and will be known as the current budget.

A formal budget maintenance system shall be developed by the *Contractor* to keep the budget information current.

The current budget provides a baseline with which to compare the *Contractor's* actual progress and performance, identify deviations from the baseline for analysis and if necessary action to possibly recover. Within the timeframe in the accepted Project Execution Plan, the *Contractor* and the *Project Manager* will agree how the cost information provided at tender return is restructured to allow monitoring of the forecast of Defined Cost against the current budget. This restructuring will take into account the requirements of the Work Breakdown Structure and Code of Accounts and will support the requirements of earned value reporting.

The breakdown of the current budget (and subsequent changes) shall be submitted by the *Contractor* for review and acceptance by the *Project Manager* at agreed intervals.

The basis for defining where budgeted costs and resources are contained within the budget structure shall be the *Project Manager's* Work Breakdown Structure and Code of Accounts. These coding systems provide a logical grouping of like cost items that result in a consistent format for monitoring, reporting, controlling and forecasting cost and performance and for retrieval of historical information. The following are the major quantifiable categories of detail that shall be included:

- People
 - Direct manual people (within the Working Areas)
 - Distributable manual people (within the Working Areas)
 - Non-manual people (within the Working Areas)
- Equipment
 - Direct Equipment
 - Distributable Equipment
- Plant and Materials

- Direct / Permanent Plant and Materials
- Distributable Plant and Materials
- Charges
- Manufacture and fabrication
- Design
- Insurance

Subcontractors

- Direct Subcontractors
- Distributable Subcontractors

Fee

- Direct Fee
- Subcontract Fee

14.3.7.2 Non Manual People Job Hour & Cost Control

The *Contractor* shall maintain spreadsheets, as agreed with the *Project Manager*, and which are updated each 4 weekly period, which shows the start and finish date for each non manual position in the *Contractor's* organisation. For each position, the spreadsheet will show the current budgeted start and finish date (as included in the current total of Prices), the actual start and finish date (as applicable), and the forecast start and finish dates (as used to develop the forecast Defined Cost).

The *Contractor* shall maintain reports, as agreed with the *Project Manager*, and which are updated each 4 weekly period in the Four Weekly Dashboard Report, that show for each cost element of non-manual costs the original budget, current budget, the actual Defined Cost, the forecast Defined Cost to go, the total forecast Defined Cost, and the variance cost of each cost element of non-manual cost.

The earnings method for non manual people costs shall be agreed between the *Contractor* and the *Project Manager*.

14.3.7.3 Distributables Cost Control

Distributable costs are cost components which cannot be exclusively associated with any specific construction operation of permanent facilities. These distributable costs include costs for mobilisation and demobilisation, non manual people, distributable manual people, temporary facilities and Materials, some construction Equipment, tools, utilities, and services.

The *Project Manager* and *Contractor* will agree on the specific distributable cost components to be specifically measured.

The *Contractor* shall maintain reports, as agreed with the *Project Manager*, and which are updated in the Four Weekly Dashboard Report,, that show for each distributable cost component the original budget, current budget, the actual Defined Cost, the forecast Defined Cost to go, the total forecast Defined Cost, and the variance cost of each distributable cost component.

The earning method for Distributable Costs shall be agreed between the *Contractor* and the *Project Manager*.

14.3.7.4 Manual People Job Hour and Cost Control

The *Contractor* shall maintain spreadsheets, as agreed with the *Project Manager*, and which are updated each 4 weekly period, which shows the status of manual people headcount for each period and by trade from the *starting date* to Completion. The spreadsheets shall show the original budgeted planned headcount (included in the initial total of Prices), the current budgeted planned headcount (included in the current total of Prices), actual headcount to date and forecast headcount to go.

The *Contractor* shall maintain reports, as agreed with the *Project Manager*, and which are updated in the Four Weekly Dashboard Report, that show for each cost element of manual costs the original budget, current budget, the actual Defined Cost, the forecast Defined Cost to go, the total forecast Defined Cost, and the variance cost of each cost element of manual cost.

The earning method for Manual Costs shall be agreed between the *Contractor* and the *Project Manager*.

14.3.7.5 Plant and Materials Cost Control

The *Contractor*, within the timeframe agreed in the Project Execution Plan , shall prepare a report for the *Project Manager* that shows, for all Plant and Materials purchase orders that the *Contractor* intends to award, the budgeted cost included in the total of the Prices.

As Plant and Materials are purchased, the *Contractor* will reconcile the pricing received and compare it to the budgeted price in the total of the Prices. The *Contractor* will maintain a report that is submitted in the Four Weekly Dashboard Report, which shows budget, commitment, actual, and forecast Defined Cost for each Plant and Materials purchase order.

The earning method for Plant and Materials costs shall be agreed between the *Contractor* and the *Project Manager*.

14.3.7.6 Equipment Cost Control

The *Contractor*, within the timeframe in the accepted Project Execution Plan, shall prepare a spreadsheet for the *Project Manager* that shows, for all major items of Equipment the start and finish dates included in the development of the total of the Prices.

The *Contractor* shall in the Four Weekly Dashboard Report, show the actual and forecast status of Equipment hours and costs against the current budget/current

total of Prices. One of the spreadsheets will show for each major item of equipment the budgeted, actual & forecast start & finish period for each major item of Equipment.

The *Contractor* shall ensure that, for each period update, the actual Defined Costs and forecast Defined Costs to-go are assessed and compared to the current budget.

The earnings method for equipment costs shall be agreed between the *Contractor* and the *Project Manager*.

14.3.7.7 Subcontract Cost Control

The *Contractor*, within the timeframe in the accepted Project Execution Plan, shall prepare a report for the *Project Manager* that shows, for all subcontracts that the *Contractor* intends to award, the budgeted cost included in the total of the Prices.

As Subcontracts are awarded, the *Contractor* will reconcile the pricing received and compare it to the budgeted price in the total of the Prices. The *Contractor* will maintain a report, that is submitted in the Four Weekly Dashboard Report, which shows budget, commitment, actual, and forecast Defined Cost for each Subcontract.

The earning method for Subcontract costs shall be agreed between the *Contractor* and the *Project Manager*.

14.3.7.8 Trend Program

The *Project Manager* maintains the Crossrail trend program which provides early identification of variances from cost and schedule baselines so that there may be sufficient time to:

- mitigate any adverse effects; or
- carry-out any actions required to achieve an identified saving or benefit.

The *Contractor* shall provide any information necessary regarding such variances to support the Crossrail Trend Program, and shall take account of variances to the cost and schedule baselines in his cost forecasting process. Such support may include information regarding scope and quantity definition, estimating, scheduling, mitigation plans and attending meetings.

The requirement of this Works Information for the *Contractor* to support the Crossrail Trend Program does not change the *Contractor's* obligations under the conditions of contract to raise early warning notifications.

14.3.7.9 Defined Cost Forecasts

At 24 week intervals (or at intervals as agreed between the *Contractor* and the *Project Manager*) the *Contractor* shall prepare a fully detailed and bottom up forecast referred to as Defined Cost forecast. The Defined Cost forecast will also include a detailed review and update of the Accepted Programme. The *Project Manager* shall work with the *Contractor* with regard to the preparation planning and co-ordination of the Defined Cost forecast, including the organisation of kick-off

meetings, data collection and management review process to meet the *Project Manager's* requirements. In addition, the *Project Manager* shall work with the *Contractor* to verify the status of the *Contractor's* forecast preparation during forecast production.

The Defined Cost forecast shall include as a minimum the following:

- establishing the forecast cut-off date, confirmation of total scope and scope completed at cut-off date;
- development and issue of agreed forecast guidelines which will include major assumptions, the division of responsibilities, the timetable and assigned resources for completion of the forecast, and the timing of cost and schedule reviews;
- the holding of a kick-off meeting;
- the forecasting of to go resources and costs for all the Defined Cost elements of the *works*;
- cost reconciliation analysis identifying specific reasons for cost variances from the total of the Prices split into scope, design development, pricing, productivity, and other issues;
- a review of the programme including status of contract milestones and float analysis;
- update of to go cost, cash, and resource profiles and graphs by period;
- risk analysis and update of risk allowances;
- preparation of forecast presentation package to *Project Manager* requirements which will include a summary of Defined Cost elements, schedule, resources, quantities, risks, and forecast basis, qualification and exclusions; and
- presentation of the forecast package to the *Project Manager*.

14.3.7.10 Quantity Tracking

The *Contractor* shall implement a quantity tracking system for the *works*, to measure installed quantities and trade labour performance for all *works*. The quantities tracked by the *Contractor* shall align with the requirements of the Code of Accounts, and the *Project Manager* and the *Contractor* shall agree the key elements (e.g. concrete, piles, rebar) that will be tracked.

The main deliverable of the quantity tracking system is the Quantity Unit Rate Report which shows quantities, job-hours (earned and actual), job-hour unit rates, performance factors, and percent complete at a level to be agreed between the *Contractor* and the *Project Manager*.

The quantity tracking system shall be initiated by the *Contractor* on the *starting date* and continues until Completion, and shall be included in the Four Weekly Dashboard Report.

14.3.7.11 Cost Flow Forecast

The *Contractor* shall submit to the *Project Manager*, within the timeframe in the accepted Project Execution Plan, and then updated for every 4 week reporting period, a cost flow forecast that forecasts the cost profile for each reporting period of the contract. The cost flow forecast shall total to the forecast Defined Cost and is to be in a format proposed by the *Contractor* and accepted by the *Project Manager*. The *Contractor* shall identify any amounts to be paid in currencies other than the *currency of this contract*.

Each 4 weekly period, the *Contractor* shall update reports and graphs to show the status of actual Defined Cost to date and forecast Defined Cost to go, by period, against the baseline budgeted cost by period. The updates shall be included in the Four Weekly Dashboard Report.

14.3.8 Programme Planning and Scheduling

In addition to the requirements of the *conditions of contract*, the *Contractor* shall resource load, with hours, cost and quantities the first revised programme for acceptance within 4 weeks of the *starting date*. The resource loading of the Accepted Programme will facilitate the use of earned value techniques for assessment of progress, cost and performance. Once accepted this programme will be known as the Baseline Accepted Programme.

The *Contractor* and the *Project Manager* shall agree on the method for resource loading of the programme, and the maintenance of the resource loading prior to the submittal of the first revised programme.

In accordance with the *conditions of contract*, the *Contractor* shall revise its programme at each 4 weekly reporting period. In addition to the requirements of the *conditions of contract*, the *Contractor* shall also include in its revised programme actual resources used, physical percent complete and hours, cost and quantities to go.

14.3.8.1 Primavera

The *Contractor* shall submit programmes to the *Project Manager* using Primavera Project Management (P6) version 6.2.1 or later versions as accepted by the *Project Manager*.

Primavera software settings shall be in accordance with the *Project Manager's* requirements.

The *Contractor's* programmes shall be in logic linked CPM network format showing the critical path(s), early start and finish dates, late start and finish dates and total float. Submissions made by the *Contractor* shall be in both hardcopy and electronic (Primavera .xer) formats.

All programme submissions made by the *Contractor* shall be clearly titled, numbered, revision coded and dated in accordance with the document control requirements.

Primavera activities shall be numbered following the *Project Manager's* numbering system structure, and organised according to a coding structure agreed between the *Contractor* and the *Project Manager*. Activity numbers shall be unique for the contract duration; no activity number shall be re-used.

All Primavera calendars used shall be set in days. For level 3 and level 4 programmes no activity shall exceed a 12 week duration without prior acceptance by the *Project Manager*.

The *Project Manager* shall supply a CD containing the system settings, activity codes and calendars in use at the *starting date* for the use of the *Contractor*.

14.3.8.2 Programme Hierarchy

The *Contractor's* programmes are intended to form an integral part of the overall Employer's programme and reporting structure. In addition to the requirements of the *conditions of contract*, the *Contractor* shall maintain a hierarchy of programmes that support each other whilst keeping detail at the appropriate level within the hierarchy. In this way duplication of effort during the update cycle should be avoided. The *Project Manager* and *Contractor* shall agree the detail and frequency of the hierarchy of programmes.

The following table identifies each level of the programme hierarchy (including programme performance graphs):-

Prog Level	Description	Comments	Software
Level 1	<i>Contractor's</i> Summary Schedule	1-2 page summary of the Accepted Programme	Excel
Level 3	<i>Contractor's</i> Accepted Programme.	Resource loaded logic-linked CPM network for use in reporting period progress, Earned Value, effects of CE's etc.	P6
Level 4	<i>Contractor's</i> Programme Performance Graphs	Suite of graphs derived from the Baseline and Current Accepted Programmes.	Excel
Level 4	<i>Contractor's</i> Engineering Progress & Performance Report (EPPR) (if applicable)	Detailed design management tool identifying each deliverable and status.	Excel or Access

Level 4	<i>Contractor's Procurement Schedule</i>	Detailed procurement control tool identifying all major purchase orders and subcontracts and their status.	Excel or Access
Level 4	<i>Contractor's Weekly Work Plan (4 week Rolling Programme)</i>	Suitable level of detail to assess progress and plan work operations on a weekly basis as agreed between the <i>Contractor</i> and the <i>Project Manager</i>	Excel
Level 4	<i>Contractor's Commissioning & Startup Programme</i>	Logic-linked CPM network for use in co-ordinating commissioning activities	P6
Level 4	<i>Contractor's Possession Programmes (if applicable)</i>	Suitable level of detail to assess sequence and timing of operations within a fixed duration possession or closure	P6 or Excel

14.3.8.3 *Contractor's Summary Schedule*

The *Contractor* shall submit a Summary Schedule with each programme submitted for acceptance.

The Summary Schedule is used as the basis for developing and reporting contract schedules to management and key stakeholders from initiation through all project completion phases. The Summary Schedule is developed in time-scaled format with typically not more than 200 activities and contained on 1-2 sheets. The Summary Schedule highlights the critical path, major milestone events and events important to the overall management of the Crossrail programme. Summary Schedule activities are related to Accepted Programme activities with status of each Summary Schedule activity "rolled up" from the *Contractor's Accepted Programme*.

The Summary Schedule shall be produced in Microsoft Excel format as a standalone document independent of Primavera i.e. it is NOT simply a summarized Primavera output. Summary Schedules may be produced in time-chainage format using *Tilos* software (Version 7.1.0) as agreed with the *Project Manager*. An updated Summary Schedule shall be included within each 4 Weekly Report by the *Contractor*.

14.3.8.4 Not Used

14.3.8.5 *Contractor's* Accepted Programme

The Accepted Programme shall be used by the *Contractor* to direct his work by providing parameters for the more detailed implementation programmes and tools such as the EPPR, Procurement Schedule and Weekly Work Plan. It is also used to identify and resolve schedule problems, measure the impact of compensation events and delays, assist in earned value calculations and develop recovery plans.

Programmes shall be developed by the *Contractor* using CPM / network analysis techniques to produce a coherent schedule that covers the entirety of the *Contractor's* awarded scope. The programmes typically contain between 1000 and 4000 activities and shall be submitted to the *Project Manager* in hardcopy and Primavera P6 electronic format (.xer). Exceeding these limits without prior approval by the *Project Manager* shall constitute cause for rejection of a programme submission.

Information to be included in the programmes submitted for acceptance

- the dates when the *Contractor* plans to submit any particulars of the design required by the Works Information;
- the dates when the *Contractor* plans to submit any particulars of the design of any items of Equipment required by the Works Information;
- the dates from the *Contractor's* Procurement Plan when any key items of Plant and Materials and Equipment are required at Site;
- the dates for any establishment of fabrication facilities and dates for fabrication of materials;
- the dates when any of the design information or other information provided by the *Employer* or Others will be required by the *Contractor*;
- details of any consents, permits and licenses development, submission and approvals allowing sufficient time for each stage of the process and also allowances for resubmission;
- details of any utility supplies development, submission and approvals allowing sufficient time for each stage of the process and also allowances for resubmission;
- details of any 3rd party (e.g. Network Rail, London Underground etc.) interfaces and/or submissions development, submission and approvals allowing sufficient time for each stage of the process and also allowances for resubmission;
- the dates when the *Contractor* plans to submit design and construction certification as required by the Works Information.

14.3.8.6 *Contractor's Programme Performance Graphs*

The *Contractor* shall prepare graphs that will assist to demonstrate the feasibility of the *Contractor's* programme in terms of cost, quantities, production rates and resources required to support the programme. They can then be used to indicate the current status of the programme in terms of progress achieved, delays experienced and potential cumulative impacts to key dates. The *Contractor* shall provide graphs derived from both the Baseline Accepted Programme and latest Accepted Programme. The *Contractor* shall provide updated graphs as part of the 4 weekly reporting cycle, which will show the plan, actual, and forecast to go. The updates shall be included in the Four Weekly Dashboard Report.

The format and number of these graphs shall be agreed between the *Contractor* and the *Project Manager*. The minimal requirements will be:

- Construction percentage complete graph;
- Installation graphs for major commodities;
- Earned value management graphs; and
- Cost and cash flow graphs.

14.3.8.7 *Contractor's Engineering Progress and Performance Report (EPPR)*

If applicable, the Engineering Progress and Performance Report is the detailed Implementation Schedule for engineering. The EPPR identifies and tracks progress against each engineering deliverable to be produced, and tracks productivity. These deliverables are then grouped to represent activities in the Accepted Programme. The EPPR is the most detailed engineering programme in the hierarchy and shall support the requirements of the Accepted Programme. Progress is measured using control points for each deliverable which shall be weighted to provide an overall percentage complete for the group of deliverables. This aggregated percentage complete is used to update the Accepted Programme. The EPPR is typically produced in Microsoft Excel or Access format as a standalone document separate from Primavera programmes. The format of the EPPR shall be generally in accordance with the standard Project template (MS Excel) included in the Four Weekly Dashboard Report, or in such other format accepted by the *Project Manager*. EPPR updates, if applicable, shall be included in the Four Weekly Dashboard Report.

14.3.8.8 *Contractor's Procurement Schedule*

The *Contractor's* Procurement Schedule identifies each purchase order and subcontract to be placed by the *Contractor*. Each item in the schedule is tracked from the issue of a requisition or design package through various control points concluding with award of the contract or placement of Purchase Order.

The Procurement Schedule is typically produced in Microsoft Excel or Access format as a standalone document separate from Primavera programmes. Information from the Procurement Schedule is summarized by the *Contractor* for inclusion in the

Contractor's programme. With the *Project Manager's* acceptance, the *Contractor* may use their own procurement tracking system. The format of the Procurement Schedule and level of information to be detailed shall be generally in accordance with the standard template (MS Excel) included in Appendix 14C, or in such other format accepted by the *Project Manager*. Information summarized from the *Contractor's* Procurement Schedule shall be used to update the corresponding activities in the *Contractor's* programme for each reporting period.

14.3.8.9 *Contractor's* Weekly Work Plan (4 week Rolling Programme)

The *Contractor* shall submit to the *Project Manager* by 10:00hrs every Monday a Four Week Rolling Programme covering day to day site fabrication, construction, testing, commissioning and startup activities. The programme shall report actual work that has taken place in the previous week and planned work for the next three weeks including the current week.

The Weekly Work Plan shall be consistent with the requirements of the Accepted Programme through use of coding structures as agreed with the *Project Manager*. The Weekly Work Plan shall be based on the confirmed availability of design, equipment, materials, labour and tools. Actual % complete against planned activities for the previous week shall be indicated.

The Weekly Work Plan shall include reasons for targets not being achieved taking into account performance measurement and actions that the *Contractor* intends to take to recover any lost time. The format of the Weekly Work Plan shall be generally in accordance with the standard template (MS Excel) and worked example included in Appendix 14D, or in such other format accepted by the *Project Manager*.

The actual progress information from the Weekly Work Plan shall be used by the *Contractor* to update the Accepted Programme. The Weekly Work Plans submitted from each area of the contract shall be the subject of a weekly review meeting attended by the *Contractor* and the *Project Manager*.

14.3.8.10 *Contractor's* Commissioning & Startup Programme

The *Contractor* shall produce a detailed Commissioning & Startup Programme to illustrate, in detail the sequence and operations required to complete the commissioning (inclusive of document preparation) and handover stage of the contract. These programmes shall be submitted by the *Contractor* in logic linked CPM format produced in Primavera for possible integration into overall Crossrail commissioning programmes by the *Project Manager*. Initial versions of the Commissioning & Startup Programme, if required by the *works*, shall be submitted to the *Project Manager* for review and acceptance at least 6 months prior to the first commissioning activity starting.

14.3.8.11 *Contractor's* Possession Programmes

If applicable, detailed programmes shall be produced by the *Contractor* for all works undertaken during possessions or closures of 3rd party infrastructure. These programmes shall have a maximum time unit of 1.0 hour unless agreed otherwise with the *Project Manager*. These programmes shall also be subjected to risk analysis by the *Contractor* to ensure that work is completed during the

possession/closure or that alternative action can be taken to ensure that infrastructure is handed back on time.

14.3.8.12 Programme Narratives

All programmes submitted by the *Contractor* for acceptance by the *Project Manager* shall be accompanied by a programme narrative and shall contain as a minimum the following requirements, at a level of detail to be agreed by the *Project Manager*.

- staffing plan indicating total manpower required per reporting period, inclusive of Subcontractors;
- list of the major construction Equipment items including types, number of units, unit capacities, the proposed time each piece will be deployed and the activities on which it will be deployed;
- description of the production rates, crew build-ups etc used to determine the durations for key quantities;
- weather windows and other non-work periods;
- description of the critical path(s);
- listing of key interfaces with the *Project Manager* or others and the dates those interfaces are planned to occur; and
- listing of information required by the *Contractor* to meet his stated programme together with the date that information is required.

In addition, submissions of revised programmes shall be accompanied by an updated programme narrative, which includes the following:

- details of any significant changes including revisions to critical path since the previous Accepted Programme;
- details of changes to Key Dates, milestones, and associated float and time risk allowances;
- any delay mitigation measures incorporated.

14.3.9 Earned Value Management

14.3.9.1 General

The *Contractor* shall carry out detailed performance measurement using Earned Value analysis techniques and produce a 4 Weekly Dashboard Report for review by the *Project Manager*. A template for the Four Weekly Dashboard Report is included at Appendix 14K.

This will require the integrated reporting of:

- programme;
- cost;
- quantities;
- manhours; and
- earned Value

At each period update the following items shall be progressed:

- activities which have actually started, shall have the actual start date input;
- activities which have actually finished, shall have the actual finish date input, the percent complete shall be set to 100% and the remaining duration shall be 0;
- activities in progress shall have their physical percentage complete updated based upon cumulative earned value relating to physical work complete;
- the programme shall then be scheduled to the progress cut-off date. Significant changes to the critical path, re-sequenced work and significant float erosion and any negative float shall be clearly explained in the Programme Narrative.

Templates for Earned Value reporting will be provided to the *Contractor* electronically by the *Project Manager*.

14.3.9.2 Resource and Cost Loading the Programme

The *Contractor* shall ensure that the programme submitted for acceptance is fully loaded with job hours, the total of the prices and quantities for performance measurement purposes using suitable resource profiles, agreed with the *Project Manager*, which reflect the work-off for each activity. The *Project Manager* and the *Contractor* shall also agree the variances required to be added to correctly calculate the forecast Defined Cost to complete and total forecast Defined Cost. For the purposes of performance reporting and measurement, the Baseline Accepted Program shall only be adjusted by agreement between the *Contractor* and *Project Manager*, to reflect the effects of implemented compensation events and/or significant changes to planned work sequences. The emphasis is to establish an accurate baseline from which to measure subsequent performance.

14.3.9.3 Cost Loading

The *Contractor* shall cost load the programme at a suitable level agreed between the *Contractor* and the *Project Manager*. Appropriate coding shall be agreed between the *Contractor* and the *Project Manager* at this time.

Sufficient cost shall be allocated to tail-end and finishing activities including snagging and completion package preparation, in order to avoid overvaluing work in the earlier stages.

Each 4 weekly reporting period, the *Contractor* shall update, in his revised program submitted for acceptance, the cost loading to reflect actual costs to date and the *Contractor's* assessment of forecast costs to go, including the impact of implemented compensation events.

14.3.9.4 Resource Loading

The *Contractor* shall resource load the programme with resources and quantities as agreed with the *Project Manager*.

Each 4 weekly reporting period, the *Contractor* shall update, in his revised programme submitted for acceptance, the resource loading to reflect actual resources used to date and the *Contractor's* assessment of forecast to go, including the impact of implemented compensation events.

14.3.9.5 Budget Maintenance Within Primavera

The *Contractor* shall not change, or move cost or resources between activities or sub-activities on the Baseline Accepted Programme without the *Project Manager's* acceptance. The *Contractor* shall use the budget transfer form included in Appendix 14E shall to seek the *Project Manager's* acceptance prior to any changes.

14.3.9.6 Planned Expenditure (BCWS: Budgeted Cost for Work Scheduled)

The *Contractor's* Baseline Accepted Program, updated with compensation events, will be the basis of the Planned Expenditure unless approved by the *Project Manager*.

Each 4 weekly reporting period, data shall be exported from Primavera at a summary level (the appropriate level to be agreed with the *Project Manager*) and formatted into a Performance Measurement Data Summary in the Four Weekly Dashboard Report which will then translate the data into graphs for comparison with earned value, actual Defined Cost and forecast Defined Cost to completion data.

The Earned Value graphs shall show the early start and late start BCWS profile envelope, which shall be generated from data downloaded from Primavera to the PMDS within Excel.

14.3.9.7 Earned Value (BCWP: Budgeted Cost for Work Performed)

The Earned Value shall be calculated by the *Contractor* for each 4 weekly reporting period following a quantitative analysis of physical work completed to date. This analysis shall be translated into % complete for each programme activity and cost component, consolidated to the summary activities agreed with the *Project Manager* and incorporated in the Cost Value Report (CVR) in the in the Four Weekly Dashboard Report for comparison with actual cost.

14.3.9.8 Actual Cost (ACWP: Actual Cost for Work Performed)

The Defined Cost (including monies paid and accruals for work performed up to the cut off date of each 4 weekly reporting period) shall be generated by the *Contractor's* accounts database coding system which shall allow all costs to be summarised by programme summary activities (as agreed with the *Project Manager*) and cost component (e.g. People, Equipment, etc.) and taking into

account the requirements of the *Project Manager's* Work Breakdown Structure and Code of Accounts. This data shall then be incorporated by the *Contractor* into the CVR in the Four Weekly Dashboard Report for comparison with Earned Value.

14.3.9.9 Cost to Completion (ETC: Estimate to Completion)

The Cost to Completion/Defined Cost to Completion will be agreed jointly between the *Contractor* and *Project Manager* every 4 weekly period. The *Contractor* shall estimate at each reporting period in the Four Weekly Dashboard Report what he considers the Cost to Completion to be. This shall take into account the *Contractor's* latest cost forecasts of the Defined Costs.

The *Contractor* shall resource and cost-load the programme with the agreed Defined Cost to Completion data. This shall be consolidated by the *Contractor* into period spend data at the same level of detail as agreed for BCWS.

14.3.9.10 Performance Measurement Analysis

The information which has been transferred to the Performance Measurement Data Summary shall be presented graphically by *Contractor* at the level of detail agreed with the *Project Manager* in the Four Weekly Dashboard Report.

Performance indicators are generated from the relationships of the following:

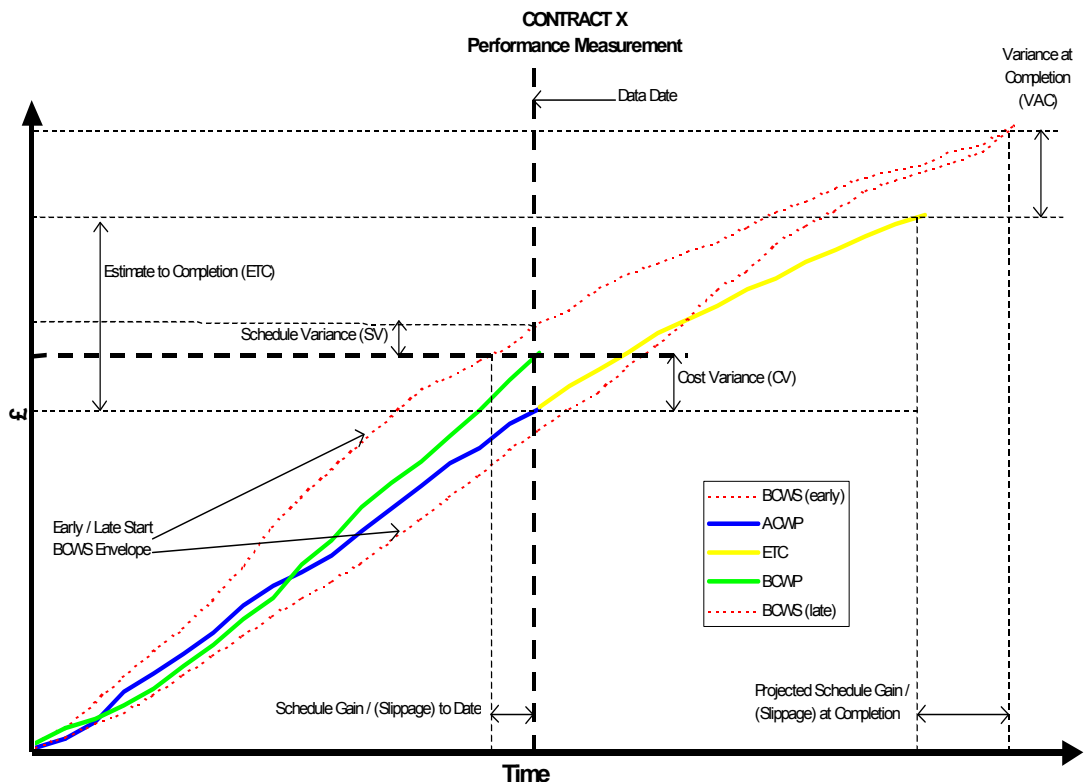


Figure 14.2 – Performance Indicator Graph

BCWS (early)	Budgeted Cost of Work Scheduled (Planned: Early Start dates);
BCWS (late)	Budgeted Cost of Work Scheduled (Planned: Late Start dates);
BCWP	Budgeted Cost of Work Performed (Earned Value);
ACWP	Actual Cost of Work Performed (Actual);
BAC	Budget at Completion (Current Target Price);
ETC	Estimate to Completion (Current Cost Forecast to Go); and
EAC	Estimate at Completion (Current Cost Forecast)

The Current Performance Indicators are:

Cost Variance	= BCWP – ACWP
Schedule Variance (Cost)	= BCWP – BCWS
Schedule Variance (Schedule)	= Current Date – Earned Date
Cost Performance Index (CPI)	= BCWP / ACWP
Schedule Performance Index (SPI)	= BCWP / BCWS

NB: CPI or SPI greater than 1 is Favourable, whereas less than 1 is Unfavourable.

The Forecast Completion Performance Indicators are:

Cost Variance at Completion	= EAC – BAC
Schedule Variance at Completion Date	= Planned – Forecast Completion Date

The *Contractor* shall present the relevant Performance Measurement Data in the with accompanying performance curves as shown and for inclusion within the 4 Weekly Progress Report.

14.4 Contract Administration Requirements

14.4.1 Periodic Project Reporting

This section covers the major reports to be prepared and submitted by the *Contractor* on a regular basis. Other reports, as agreed with the *Contractor*, may be required by the *Project Manager*.

14.4.1.1 Daily Construction Report

The *Contractor* shall each day produce a Daily Construction Report, for each area working that day, which shall be submitted to the *Project Manager* and his staff and shall contain as a minimum:

- Safety, environment and security. Including a general description of significant events on Site;
- Daily manpower. The report shall indicate the number of manual (direct and indirect) and non-manual people on Site, allocated by trade and whether directly employed or non directly employed people;
- Daily Equipment. The report shall indicate all major items of Equipment on Site and whether they are working or standing;
- Daily Plant and Materials. The report shall indicate all items of Plant and Materials on Site;
- Description of Work performed / special comments. The report shall include a brief description of the work being carried out that day for each area, the initiation or completion of any significant event, major items of Equipment, Plant and Materials received, removed or installed, work stoppages, interruptions, delays and potential causes of delay; and
- Weather records. Including a general description and any significant events.

The *Contractor* shall present this report, by 10:00hrs working day, in the Project Daily Construction Report Template and Example included within Appendix 14F.

14.4.1.2 Weekly Progress Report

A 1 to 2 page Weekly Progress Report shall be prepared by the *Contractor* for review by the *Project Manager*. This report shall be finalised and submitted to the *Project Manager* by 9am on the Friday in the week to which it relates. The report shall contain sections on health and safety, environment and security, key contract issues, performance indicators, weekly performance measurement, progress and quantities installed, Network Rail interfaces, London Underground interfaces, design, consents, procurement, quality assurance, environment and community relations, a financial section identifying compensation events notified or implemented that week, and any critical items. A critical item is defined as any item that has caused or is likely to cause an impact to a schedule key date or to planned Completion. It should be noted that not every schedule delay results in an impact to a key date and therefore not every delay counts as a critical item.

The *Contractor* shall use the Weekly Progress Report Template and Example included in Appendix 14G.

14.4.1.3 Four Weekly Progress Report

The *Contractor* shall submit for review by the *Project Manager*, a Four Weekly Progress Report, within five working days of the contract reporting cut-off date in electronic format. The *Contractor* shall submit his report each Period in accordance with the Project reporting cycle programme included in Appendix 14H. The *Contractor* shall use the standard Project Four Weekly Dashboard Progress Report template (which may change from time to time) included within Appendix 14K. The

Contractor shall ensure that the report does not exceed the number of pages specified within the standard template.

As stated in 14.2.2.4, the *Contractor* shall attend four weekly meetings to discuss the Four Weekly Progress Report, and provide hard copies of the Report for discussion (number of copies to be agreed with the *Project Manager*).

14.4.1.4 Not Used

14.4.1.5 Quantity Unit Rate Report (QURR) and Quantity Performance Graphs

The main deliverable of the Quantity Tracking System (QTS) is the Quantity Unit Rate Report (QURR) which shows key quantities, job-hours (earned and actual), job-hour unit rates, performance factors, and percent complete at a level to be agreed between the *Contractor* and the *Project Manager*.

The format and content of the QURR shall follow the format of the Project QURR included in the Four Weekly Dashboard Report. The QURR shall be submitted weekly by the *Contractor* to the *Project Manager* for review at least 1 working day prior to the weekly meeting where variances shall be discussed.

The *Contractor* shall produce, as agreed with the *Project Manager*, quantity installation and performance graphs to assist in the monitoring and management of the contract. The key quantities to be covered and job hour quantification shall be agreed between the *Contractor* and the *Project Manager*.

14.4.1.6 Cost Value Report (CVR)

The *Contractor* shall produce a four weekly Cost Value Report (CVR) for review by the *Project Manager* which shows cumulative and period movement data in accordance with the template included in the Four Weekly Dashboard Report. It is reviewed in detail jointly by the *Contractor* and *Project Manager* at the Four Weekly Progress Review Meeting. Where this review identifies areas of significant variance between cost and value, the *Contractor* shall investigate, explain and proposed mitigation measures to the *Project Manager*. The *Contractor* shall provide any information necessary to support the Crossrail Trend Program.

All cost/budget transfers (including explanations, e.g. misallocation of cost) shall be recorded by *Contractor* and accepted by the *Project Manager* prior to issue of the Cost Value Report (CVR).

14.4.1.7 Report Submission Frequencies

Submission	Frequency	Comment
Summary Schedule	With each Four Weekly Dashboard Report	Status reflects <i>Contractor's</i> revised program.
<i>Contractor's</i> revised programme submitted for acceptance.	With each Four Weekly Dashboard Report.	For performance measurement reporting purposes. Refer to Project calendar and

		reporting programme for cut off dates.
Four Weekly Dashboard Report	Four Weekly	Comprises several worksheets
EPPR (if applicable)	With each Four Weekly Dashboard Report	
Procurement Schedule	With each Four Weekly Dashboard Report	
Weekly Work Plan	Every Monday before 10:00hrs.	
Commissioning and Startup Programmes (if applicable)	Initial submission 6 months prior to first commissioning activity. Subsequent submissions as agreed with <i>Project Manager</i> .	
Possession Programmes	12 weeks, 4 weeks and 1 week prior to start of possession	Successive revisions required for readiness reviews
Risk Log	4-weekly, where it has been agreed with the <i>Project Manager</i> that ARM is not used	

14.4.2 Fair Payment Charter

14.4.2.1 Principles

In June 2007 the Office of Government Commerce produced a guide to fair payment practices as part of its “Achieving Excellence in Construction” series. This guidance was in response to both public sector and industry concern about the impact of poor payment practice on the supply chain. The guidance proposed that public procurement contracts adopt a charter to promote fair payment throughout the supply chain whilst a further study will move to seeking ways to make fair payment a contractual commitment.

The *Employer* has adopted a Fair Payment Charter for the Project which is broadly based on the recommendations of the Office of Government Commerce guidance. The Fair Payment Charter is attached in Appendix 14L. The *Contractor* signs the Fair Payment Charter within 1 week of the *starting date* to endorse its willingness to abide by the principles of the charter. The *Contractor* procures that its

Subcontractors and suppliers and their subcontractors endorse their commitment to work within the principles of the charter.

To support the adoption of the Fair Payment Charter the *conditions of contract* include the provision of a Project Bank Account and Trust Deed to protect the interests of the *Employer*, the *Contractor*, Subcontractors and suppliers.

The *Project Manager* shall audit the *Contractor's* compliance with the Fair Payment Charter. The *Project Manager* and the *Contractor* shall agree any performance improvement measures arising from such audits.

14.4.2.2 Not Used

14.4.3 Project Bank Account

14.4.3.1 General

The *conditions of contract* include a requirement for the *Employer* to set up a Project Bank Account (PBA) in the name of the *Employer*. The *Employer* opens the PBA within 3 weeks of the contract date.

The *Employer* will pay the amount due to the *Contractor* into the PBA. The *Contractor* shall use the PBA for the payment of all Defined Cost incurred in connection with this contract and payment of Value Added Tax in connection with the *works*. The *Contractor* may transfer the *Contractor's* Fee from the PBA for onward disbursement or use the PBA for payment of disbursements covered by the Fee.

The PBA shall allow for remote access and administration via any web enabled computer system subject to the *project bank's* access constraints and security requirements. The *Employer* shall be the lead system administrator for the PBA. The *Contractor* will have access rights that allow the *Contractor* to view and authorise payments from the PBA.

14.4.3.2 Trust Deed

The form of the Trust Deed which the *conditions of contract* require the *Contractor* and *Employer* to enter into relating to the Project Bank Account is attached at Appendix 14M.

14.4.4 Records of Defined Cost

14.4.4.1 Payment

The *Contractor* shall ensure that no payments are made from the Project Bank Account against invoices which exceed order values. In the event that an invoice exceeds its order value, commitment authorisation shall re-commence, including budget reconciliation and re-authorisation at relevant approval levels. The *Contractor* shall provide any information necessary regarding deviations from the budget to support the Crossrail Trend program.

14.4.4.2 Accounts and Records of Defined Cost

In addition to the accounts and records the *Contractor* is required to keep in accordance with the *conditions of contract*, the *Contractor* shall keep the following

- separate and readily identifiable accounts and details for all monies paid out and incurred in respect of the addition to, alteration, diversion, protection, removal or replacement of existing apparatus belonging to or used by statutory undertakers;
- cash and bank transactions and reports;
- cost ledger transactions and reports;
- purchase ledger transactions and reports;
- sales ledger transactions and reports;
- Subcontract ledger transactions and reports;
- expenses transactions and reports;
- petty cash transactions and reports;
- capital expenditure reports;
- labour details and reports;
- monthly paid staff details and reports; and
- any cost paid by the *Employer* on behalf of the *Contractor*;

14.4.4.3 Administration

Within the timeframe agreed in the Project Execution Plan, the *Contractor* shall produce an Accounts Administration Plan for the *Project Manager's* review. The plan may include existing corporate procedures, plans or other documents provided that these meet legal requirements and the requirements of this contract.

The plan shall ensure that the *Contractor's* accounts management procedures include requirements to:

- Cash Book and Bank Reconciliations
 - provide copy of the bank mandate detailing signatories of those authorised to sanction payment from the Project Bank Account.;
 - provide an electronic link to enable the *Employer* to monitor the bank account;
 - maintain a cashbook with detailed analysis;

- complete weekly reconciliations between the cash book and bank account statements including those to be prepared at every assessment date, normal period end, and more frequently if deemed necessary by the *Project Manager*. The cashbook is to include allocation of all direct cost entries by the generic categorisation described in the Schedule of Cost Components:
 - People;
 - Equipment;
 - Plant and Materials;
 - Charges;
 - Manufacture and fabrication;
 - Design; and
 - Insurance.
- Along with Subcontract cost as well as an allocation to the applicable cost code within the agreed WBS; and
- maintain an interest received schedule.
- Cost Ledger
 - maintain a cost and commitment ledger and reporting system;
 - code all costs in accordance with the Project coding system by each activity and by each activity main element of the Schedule of Cost Components; Ensure all journals transferring cost from one cost centre to another are documented and reported to the *Project Manager* along with the Cost and Performance Report including a narrative explanation as to why the transfer has been made; and
 - code all compensation events and Disallowed Costs in accordance with the contract coding system.
- Purchase Ledger
 - process Invoices/Credit Notes – from receipt to payment including matching to GRN's, plant hire returns, purchase orders, invoices held in query;
 - monitor spend against purchase orders and produce printed records for audit purposes;
 - retain all purchase order documentation and any changes thereto;

- not to make any 'on-account' payments without the prior acceptance of the *Project Manager*;
- assess accruals and provide an accrual print to the *Project Manager* as backup for his assessment of the amount due; and
- monitor Debit Balances.
- Capital Expenditure
 - monitor the effectiveness of purchase of Equipment against hire;
 - set authority levels required for purchase of assets;
 - manage capital purchases utilising a temporary assets management procedure
- Equipment Hire
 - monitor Equipment on and off hire dates;
 - make site production personnel accountable by use of detailed site requisition documentation including work areas, operations and hire durations of operated plant and small tools;
 - control Equipment utilisation and build up of cost;
 - demonstrate that selection was made on open market rates;
 - maintain and review a Equipment register;
 - monitor, check and record deliveries and removal of Equipment;
 - provide Equipment and labour returns to the *Project Manager* on a weekly basis; and
 - monitor the effectiveness of hire against purchase of Equipment for all items where the *Contractor* proposes to long term hire (periods in excess of 6 months). The *Contractor* shall provide the *Project Manager* with an exception report that demonstrates the cost effectiveness of long term hire against purchase of the Equipment item.
- Materials
 - monitor, check and record deliveries and removal of materials; and
 - control material wastage, reconciliation and management; produce exception reports on bulk materials.
- Sales Ledger

- process sales invoices;
- record proceeds for Temporary Labour Accommodation/Scrap/Assets, work for third parties etc; and
- pursual of outstanding debtors.
- Subcontract Ledger
 - monitor spend against Subcontract orders and produce printed records for audit purposes;
 - retain all Subcontract order documentation and any changes thereto;
 - retain all relevant documentation/backup to payments;
 - monitor CIS certificates and maintain a CIS register;
 - Subcontract final accounts;
 - effectively manage back to back contracts with Subcontractors; and
 - monitor internal company charges and Fee on fee issues.
- Expenses
 - monitor expenditure;
 - review authorisation levels for expenses; and
 - process and payment of expenses.
- Petty Cash
 - details of floats held, cashier authorisation levels;
 - monitor petty cash expenditure; and
 - process and pay expenses.
- Labour Direct and Indirect
 - control the take on of labour by the completion of detailed labour requisitions outlining trade requirement, work area/description and duration of operations together with originators name countersigned by senior site managers;
 - the *Contractor* shall submit to the *Project Manager* for review all approvals for major labour intakes;

- as a minimum requirement provide and monitor attendance for all People involved who Provide the Works through the use of swipe cards/clock cards which record hours worked on a daily basis;
 - provide a daily labour attendance summary;
 - provide a daily summary of labour by trade;
 - operate a labour control system based on time-sheets authorised by site staff and coded according to the agreed code of accounts. Timesheets to be monitored and checked against the swipe card / clock card attendance control records generated by the *Contractor*;
 - daily time /allocation sheets shall be reconciled weekly to clocked/booked hours/
 - provide an analysis of holiday accruals and actual holiday payments;
 - provide when requested by the *Project Manager* payroll build-ups and information to support pay entitlements for operatives;
 - National Insurance Contribution build ups; and
 - labour to be employed on direct status basis wherever possible in accordance with the current *Project Manager's* Industrial Relation Procedures.
- Monthly Paid Staff
 - provide and monitor attendance for all staff involved who Provide the Works through production of weekly/monthly timesheets;
 - provide an attendance register for salaried staff on a weekly basis highlighting periods of study, sickness, absenteeism, holidays etc;
 - utilise timesheets to code staff cost according to the agreed code of accounts; and
 - provide when requested by the *Project Manager* payroll build-ups and information to support pay entitlements for staff.

14.4.4.4 Other Requirements

- Record details of all insurance payments received from Insurers;
- VAT Returns and Records;
- Delegated Authority for control of expenditure with specimen signatures;
- Provide Staff organogram to the *Project Manager* for all site based staff and where relevant head office staff;

- The *Contractor* shall ensure that costs can be effectively checked and verified by the *Project Manager* via uncomplicated audit trails in order to ascertain Defined Cost and allow the *Project Manager* to decide whether any costs should be classified as Disallowed Cost;
- The *Contractor* shall actively review Defined Cost and determine that all transactions processed are covered under the Schedule of Cost Components for both himself and his Subcontractors;
- The *Contractor* shall ensure that the *Project Manager* is given access to its accounts and records in order to support the payments that have been and / or are to be proposed to be made from the Project Bank Account on a daily basis;
- Any cost incurred in relation to insurance claims shall be recorded separately within the *Contractor's* Cost Accounting System;
- The *Contractor* shall establish appropriate financial systems to provide confidence that reported costs and applications for payment are complete, accurate and in compliance with the contract; and
- The *Contractor* shall establish appropriate and fit for purpose controls to minimise the risk of fraud and mis-statement of costs and Subcontractor insolvency.

14.4.4.5 Management of Temporary Assets

The *conditions of contract* provide that items of Equipment may be purchased for the *works* and sold at open market sale price at the end of the period for which the Equipment is required or available for use. The *Contractor's* management plans for the *works* shall include procedures for the management of such temporary assets (where the purchase price per item or collection of same or similar items exceeds £5,000) that shall include:

- a method of demonstration that purchase of Equipment represents the most economic procurement method and the *Project Manager's* acceptance of the proposal;
- the marking of temporary assets with a unique reference number and as the property of the *Employer* in a manner acceptable to the *Project Manager*;
- maintenance of a temporary asset register that identifies each asset purchased, its unique identification number, the purchase date, the purchase price and forecast residual value, the location of the asset and the person responsible for its safe keeping, any maintenance requirements including the interval of such maintenance, the anticipated date of release for sale and the cost credited to Defined Cost as a result of the sale;
- a process for regularly recording the condition of the temporary asset and updating the register; and

- records of the *Project Manager's* acceptance that the temporary asset is no longer required for the works and the *Contractor's* process for managing the disposal of temporary assets.

14.4.4.6 Not Used

14.4.4.7 Assessments for Payment

General

In accordance with the requirements of the *conditions of contract*, the *Contractor* shall submit to the *Project Manager* on or before each assessment date applications for payment which will include the following:

- a Summary of Defined Cost incurred up to the assessment date broken down into the major resource components of:
 - Each main element of the Schedule of Cost Components; and
 - Subcontractors.

All supported by the following:

- bank statements;
- cash book and analysis;
- cash book – bank statement reconciliations;
- interest received schedule; and
- Fee.

The Cash Book shall include all transactions relating to the works from the *starting date* until final payment in a format acceptable to the *Project Manager*. For the purposes of assessment of the amount due, the *Contractor* shall provide the value of:-

- invoices passed for payment – ledger balance;
- accruals;
- forecast of payments up to the next assessment date broken down into the major resource components of:
 - each main element of the Schedule of Cost Components; and
 - Subcontractors;
- VAT due to Her Majesty's Revenue and Customs in period;

- forecast of expected Income in period to including interest received and other income; and
- A forecast of all further payments that will have been paid by the Contractor before the next assessment date broken down into the major resource components of:
 - Each main element of the Schedule of Cost Components
 - Subcontractors.

All items on *Contractor's* application shall be net of VAT.

VAT is applied to the total application. However, the *Contractor* is to separate any items that are not subject to VAT at the standard rate.

14.4.4.8 Subcontractor's Deduction Scheme

This scheme applies to both the *Contractor* and its Subcontractors.

The *Contractor* shall within 15 days of the *starting date*, produce its current Construction Industry Scheme CIS tax certificate to the *Project Manager* for inspection and validation.

During the course of the contract, if a CIS tax certificate expires, the renewed certificate shall be produced by the *Contractor* or an updated certifying document provided, prior to the next payment certification date.

Following payments, the *Contractor* shall provide any necessary gross payment voucher or company gross payment voucher, as appropriate, to the *Project Manager*.

Failure by the *Contractor* to comply with the above shall result in a non-payment of relevant costs.

The *Contractor* shall ensure that he requests and checks similar documentation from its Subcontractors.

14.4.4.9 VAT Invoice

The *Contractor* shall submit a VAT invoice containing all details as required by Her Majesty's Revenue and Customs to the *Employer* within 2 days of receipt of the *Project Manager's* payment certificate.

14.4.4.10 Tender Appraisal / Bid Analysis / Recommendation

The *Contractor* shall produce bid / tender analysis along with a tender recommendation report for award of subcontracts or purchase orders with a value of £10,000 or above. All such recommendations shall clearly identify and reconcile relevant contract budget allowances, with explanations between the recommended award value and the budget allowance. The Contractor shall provide any information necessary regarding deviations from the budget allowance to support the Crossrail

Trend program. The *Contractor* shall carry out financial checks on all proposed Subcontractors to reduce the risk of Subcontractor insolvency, administration or similar financial failure and include the results of these checks in its tender recommendation report.

14.4.4.11 Administration of Insurances

The *Contractor* shall comply with the *Employer's* claims protocol for the notifying and handling of insurance claims.

14.4.4.12 Progress Photographs

The *Contractor* shall employ a professional photographer accepted by the *Project Manager* to take thirty colour digital photographs each month (minimum resolution ten mega-pixels) recording the progress of the *works* for promotional purposes. The general areas to be photographed are to be accepted by the *Project Manager*.

The *Contractor* shall load each digital image onto a file share system to be specified by the *Project Manager* along with the following information:

- date of photograph;
- brief description/location;
- photographer's name and contact details; and
- serial number based on date (for example 070809-1 for photo taken on 7th August 2009).

The terms and conditions under which the photographer is engaged shall provide for the copyright of all photographs to be vested in Crossrail Ltd.

Taking photographs for promotional purposes on or about the site is not permitted unless by an authorised photographer as described above, or with express written permission of the *Project Manager*.

14.4.4.13 *Contractor's* Proposals to change the Works Information

Any proposal to change the Works Information contains:

- detailed scope of the change detailing which specific sections of the Works Information are to be changed;
- a schedule detailing how the proposed change is to be effected, including activities and anticipated durations for any resulting design changes to be undertaken by the *Employer*, additional or revised consents, amended key dates and other relevant information;
- a proposed revised programme for the remaining work is affected; and
- forecast savings in actual cost and a forecast of any additional costs of other parties and/or the *Project Manager*.

14.5 Risk Management

14.5.1 General

The *Employer's* risk management policy recognises that managing risk is critical to the successful delivery of Crossrail, and a Project wide risk management framework has been being implemented to enable effective and efficient risk management.

The *Contractor* shall carry out his own risk management activities in order to actively identify and manage risk and to provide assurance to the *Project Manager* that the risks associated with delivering the works are fully recognised, understood and effectively controlled.

The *Contractor* shall involve the *Project Manager* in the implementation of these risk management activities.

The risk information developed under this section of the Works Information does not replace the Risk Register referred to in the *conditions of contract* and maintained by the *Project Manager* in relation to early warning notices.

14.5.2 Risk Management Requirements

General

The *Contractor* shall describe the activities that he will undertake to manage risk associated with delivering the contract in a procedure or other appropriate document. This document will be subject to acceptance of the *Project Manager*.

The *Contractor's* procedure will follow the process outlined below.

A contract risk in this context can be defined as a threat of any type (schedule, safety, cost, quality, reputation, etc.) which could adversely affect the achievement of the contract.

The *Contractor's* procedure will recognise that:

- There are certain categories of risk that the *Contractor* is responsible for managing, and certain categories of risk that the *Employer* is responsible for managing;
- Risks will vary dependent on delivery stages of the works (design, construction, commissioning and handover), and that some risks will remain beyond the completion of one delivery stage;
- There are a number of other risk based processes being used on the Project (for example Designing for Health and Safety, CDM) which are subject to different requirements.

Accountabilities and Responsibilities

The *Contractor* shall:

- Define clear accountability for the management of risk within the *Contractor's* organisation and for the maintenance of the risk management process;

- Ensure that risk management is carried out fully within their teams and that all staff have an appropriate level of competency and training in risk management;
- Make available adequate competent specialist resource to ensure that risk management obligations are met including the appointment of a Risk Manager;

Deliverables

The risk management process will produce the following deliverables:

- A plan describing which risk assessments will be carried out, when these will be done, who will be involved.
- A log of significant risks – the *Contractor Risk Log* – to be used for discussion with the *Project Manager*. The *Contractor Risk Log* will reflect those risks inherent in the contract that the *Contractor* considers are material to the contract objectives, and which are necessary to provide assurance to the *Project Manager* that the key risks are being appropriately managed. This will form the basis of meetings with the *Contractor* and *Project Manager* to jointly review the risks.
- Further risk information as appropriate to support the management of the works. This information shall be made available for review by the *Project Manager* in a suitable format.
- A regular report of the key risks and risk management actions based on the *Contractor's Risk Log* described above and presented in a format determined by the *Project Manager*.
- Comprehensive records to demonstrate the application of continuous risk management practices (e.g. records of meetings, approvals).
- Other reports, KPIs and measures as required to ensure that the effective management of the process.

Governance

The *Contractor* shall, on a regular basis jointly review the key risks and risk management performance with the *Project Manager*. At this meeting, the *Contractor* and *Project Manager* should review the contractor Risk Log, and the risks owned by the *Contractor* and each should communicate any emerging risks that the other is best placed to manage.

Systems

The *Employer* has implemented ARM (Active Risk Manager) as a Project wide risk management system.

Unless agreed otherwise by the *Project Manager*, the *Contractor* shall maintain the *Contractor Risk Log* in ARM.

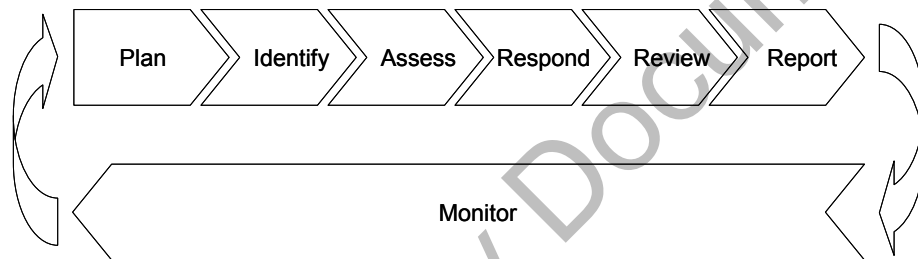
The *Contractor* shall as appropriate record further risk information using the MS Excel Risk Log template (see example in Appendix 14R) or an equivalent of their own accepted by the *Project Manager*.

Quantified Risk Assessment

The *Contractor* shall provide assistance to the *Project Manager* in undertaking cost and schedule risk assessments by contributing to workshops and advising on quantitative assessment of risks as required.

14.5.3 Risk Management Process

The *Employer* has defined a risk management process consisting of seven iterative steps as illustrated and described below:



Step 1: Planning

The definition and documentation of risk management activity describing which risk assessments will be carried out and when, who will be involved and the frequency and nature of subsequent reviews. This will reflect the structure/categories of risk in the *Contractor* Risk Log and the full scope of the Works (including its complexity and geographical spread) and the contract objectives.

The contract objectives, as agreed with the *Project Manager*, Are likely to include: meeting safety, health, environmental and security requirements; meeting cost, time and quality targets; complying with relevant policy, legislation and regulations and maintaining effective stakeholder relationships.

Step 2: Identification

The comprehensive and systematic identification of all risks to delivering the scope of work being considered. Risk identification should be carried out in all phases of the contract, with the full involvement of all relevant parties and take into account all useful information (including execution plans, drawings, etc.), Note that 'significant', 'unmitigated' risks from other risk based processes (e.g. Designing for Health and Safety, CDM) should be considered and recorded within this process as appropriate.

Each risk should have causes (i.e. events/circumstances that would lead directly to the risk occurring) and effects (i.e. scenarios that result from the risk occurring) identified.

A risk owner should be identified for each risk and they should confirm that they accept accountability for managing the risk.

All risk information should be recorded in the defined format using the agreed application.

In addition to the initial risk identification exercise (probably a workshop or facilitated meeting) and subsequent reviews, a simple mechanism for capturing risks identified outside formal risk identification workshops should be provided.

Step 3: Assessment

The systematic assessment of probability and impact to determine the severity of a risk using a consistent set of criteria in order to drive management attention and prioritisation of response actions. Qualitative probability and impact scales and a Risk Assessment Scheme (Probability Impact Diagram or PID) are provided to help ensure consistency (see Appendix 14Q) and the assessments should be recorded against the relevant risk.

Two assessments will be made: the 'current' assessment which allows for the effectiveness of all existing control measures and the 'forecast' assessment which allows for the estimated effectiveness of the response plan. Note that control measures may be pro-active (reducing the probability) or reactive (reducing the impact).

In order to inform the 'current' assessment of each risk the existing control measures already applied should be identified and recorded and the effectiveness of those control measures should be considered.

Step 4: Response

The identification of a response strategy and specific actions required to mitigate the risk to a satisfactory level. Identifying an appropriate response strategy and actions and ensuring that these actions are effected is the responsibility of the risk owner. Note that response strategies should either treat, terminate, tolerate or transfer the risk and response actions should be specific, measurable, achievable, relevant and timed. (SMART).

A response owner should be identified by the risk owner for each response and they should confirm that they accept accountability for completing the action.

After identification of a response strategy and actions, the 'forecast' assessment should be made with reference to the Risk Assessment Scheme (see Appendix 14Q); The likely effectiveness of further response actions should be considered.

When an action is completed, the risk should be reassessed to reflect any newly introduced existing control measure.

Step 5: Review

Consists of two elements:

The regular review of risks by risk owners to ensure that all risk information recorded is accurate and up to date and that response actions are progressing as planned.

The formal review and approval and of the risk information in full by the accountable manager to enable it to be used for reporting. In the event that the accountable manager will not approve (part of) the risk information (e.g. due to the inadequacy of existing control measures) they will agree those additional response actions necessary with the relevant risk owner, prior to approval.

Step 6: Reporting

The regular reporting of the key risks, and management actions to inform and provide assurance to key stakeholders that risks are being appropriately managed. Reporting must be in an agreed format, based on current risk information held in the agreed application. It may also be necessary to escalate some risks to the attention of line/senior management.

Step 7: Monitoring

The continuous systematic and formal monitoring of the implementation of the risk management process and its outputs. This could include self-assessment, internal audit or detailed reviews by independent external experts.

14.6 Communications

14.6.1 Not Used

14.6.2 Hosted Web Servers

The following hosted web servers will be used for communications on the contract:

- The Project's EDMS (Electronic Document Management System) used for all contract communications except for those communicated through PTR and IMS-RIVO Safeguard..
- PTR - the Project's technical request system used for the issue of site queries, requests for information, technical acceptance (for example substitute products proposed on a 'similar and acceptable' basis) and confirmations. Also used to manage the Defects/Non-conformities notifications and procedures.
- Punchworks - the Project's 'snagging' system used for the close out of defects and outstanding works up to Completion.
- IMS-RIVO Safeguard - the Project's incident management system used for notification, reporting, recording and tracking actions and close out of Incidents.

The *Employer* will provide the *Contractor* with access to systems operating on hosted web servers. The *Employer* will be responsible for support and maintenance (including database administration) of the hardware and software.

The *Project Manager* and will manage the system user accounts.

The *Contractor* shall nominate users for these systems and notify the *Project Manager* immediately of any changes necessary to user accounts to avoid mis-use

of the systems. The *Contractor* will be held liable for any mis-use of these systems by its nominated users

14.6.3 Training on Web Based Systems

The *Project Manager* will provide training in the use of these systems to the *Contractor's* nominated representatives on a 'train the trainer' basis. It will be the responsibility of the *Contractor* to train any further users.

14.6.4 Not Used

14.7 Document Control and Management

14.7.1 General

The *Contractor* shall submit and receive documents through the *Employer's* EDMS system

The *Contractor* shall follow the *Project Manager's* document management procedures including the supporting guide information known as QRGs (Quick Reference Guides) to manage its documentation.

The *Contractor* and the *Project Manager* shall establish a single joint and common filing system, as agreed under the CMDL; such that the *Project Manager* shall have access to the *Contractor's* working and EDMS electronic files structure.

14.7.2 Document Submissions, Numbering and File Coding Structure

All *Contractor* deliverable documents shall follow the taxonomy (*Employer's* project numbering) as required by the *Project Manager*. All documents shall be submitted as detailed on the Contract Master Deliverable Template as included in the accepted Project Execution Plan.

This Taxonomy allows for documents to be suitably numbered and stored with the Project's EDMS.

The *Employer's* Taxonomy shall be prominently displayed on all deliverables submitted by the *Contractor*.

The decal label shall be applied by the *Contractor* on the front cover of all deliverables.

The following *Project Manager's* acceptance status of all deliverables shall be recorded by the *Contractor* on the CMDL.

Figure 14.2 – *Project Manager's* Review Decal

Document status and reasons for issue shall be used as specified by the *Project Manager's* document management procedure.

14.7.3 Document Management Reporting

The Contractor may use the EDMS to facilitate the creation of reporting of the status of deliverables.

14.7.4 Document Revision/Issue Coding System

The *Contractor* shall adopt the following suitability status and coding system as agreed with the *Project Manager* when submitting drawings and documents.

As Built
As Installed
Cancelled
Comprehensive Revisions Needed
Fit For Approval
Fit For Authorisation
Fit For Commissioning
Fit For Construction
Fit For Construction but with Comments
Fit For Co-ordination
Fit For Costing
Fit For Design
Fit For Implementation
Fit For Information
Fit For Manufacturing/Procurement
Superseded
Fit for Acceptance
Fit for Review
Fit For Stakeholder Acceptance

All documents submitted via the EDMS shall start with revision 1.0. The revision numbers shall then increment by one full number to the next revision as the document progresses through the various review/approval stages.

14.7.5 Document Submissions

All submissions shall be formally communicated via the EDMS

14.7.6 Not Used

14.7.7 CAD Data/Drawing Management

The *Contractor* shall use the ECMS and the *Employer's* CAD Standards to manage the production, submission, review and acceptance of CAD Data (3D models and drawings) that make up the *works* for the duration of the contract.

The *Employer* will provide the *Contractor* with gateway access and configuration files for the ECMS.

14.8 Lessons Learned

The *Contractor* is required to participate in and contribute to the Project lessons procedures. Within the timeframe and at frequencies agreed with the *Project Manager* in the Project Execution Plan, the *Contractor* shall participate in a joint lessons learned workshop` with the *Project Manager*. The scope of this workshop will include but not limited to:

- a review of historic lessons learned from other projects of similar scope;
- a review of historic lessons learned from the design, enabling works, site investigation phases of the Project; and
- a review of lessons relating to procurement activities including Subcontractor performance.

14.9 Procurement Requirements

14.9.1 General

The *Contractor* shall submit detailed procurement procedures to the *Project Manager* for acceptance within the timeframe agreed in Project Execution Plan. The procurement procedures shall define the processes leading to the procurement of Equipment, Plant and Materials, Subcontractors and services including the acceptance by the *Project Manager* of Subcontractors.

The *Contractor* shall comply with the procurement procedures that have been accepted by the *Project Manager*, and shall submit a detailed Procurement Schedule, in accordance with the standard template (MS Excel) included as Appendix 14C.

14.9.2 Procurement Schedule Revisions

The Procurement Schedule shall be revised by the *Contractor* and submitted to the *Project Manager* every four weeks, or at such other frequency as may be instructed by the *Project Manager*.

As agreed in the Project Execution Plan, the *Contractor* shall attend Four Weekly Progress Review Meetings with the *Project Manager*, and review status and actions of items on the Procurement Schedule, as may be instructed by the *Project Manager*.

14.9.3 Critical Packages

Packages that have programme criticality, and / or are in some other way regarded as having critical importance to the successful achievement of the objectives of the contract will be deemed critical packages.

For packages advised by the *Project Manager* as being deemed critical, the *Contractor* shall ensure that the list of proposed subcontract tenderers has been agreed to by the *Project Manager* prior to tenders or bids being invited.

For critical packages, the *Contractor* shall provide a subcontract cash flow concurrent with each submission of a critical package subcontract for acceptance.

Critical packages will have an enhanced level of scrutiny over a Subcontractor's ability to Provide the Works, financial capacity and standing than non-critical packages.

14.9.4 Acceptance of Subcontractors

The *Contractor* shall use the template pro-forma subcontract Acceptance Checklist provided at Appendix 14P for the submission of proposed Subcontractor names, Subcontract details and supporting information as required under clauses 26.2 to 26.4A inclusive of the conditions of contract, and in compliance with other related requirements.

In making the submission(s) the *Contractor* shall fully complete the subcontract Acceptance Checklist and provide all of the relevant supporting information where required.

14.9.5 Not Used

14.10 Appendices

Appendix 14A Indicative Work Breakdown Structure

Appendix 14B Indicative Code of Accounts

Appendix 14C Procurement Schedule Template

Appendix 14D Weekly Work Plan Template and Example

Appendix 14E	Budget Transfer Form Template
Appendix 14F	Daily Construction Report Template and Example
Appendix 14G	Weekly Progress Report Template and Example
Appendix 14H	Project Reporting Cycle Programme
Appendix 14K	Four Weekly Dashboard Report Template
Appendix 14L	Project Fair Payment Charter
Appendix 14M	Project Bank Account Trust Deed
Appendix 14N	Not Used
Appendix 14P	Subcontract Acceptance Checklist
Appendix 14Q	Risk Assessment Scheme – Probability Impact Diagram
Appendix 14R	Contract Risk Register Tool

Learning Legacy Document

Part 15 – Responsible Procurement

15.1 Introduction

The *Contractor* shall comply with the *Employer's* Responsible Procurement policy which is available at <http://www.london.gov.uk/rp/policy/>.

15.1.1 Not used

15.2 Responsible Procurement Representative

The *Contractor* shall appoint a Responsible Procurement Representative. The *Contractor's* Responsible Procurement Representative shall be the primary contact for all Responsible Procurement related matters under the contract;

15.3 Responsible Procurement Plan

Within 4 weeks of the *starting date*, the *Contractor* shall produce a Responsible Procurement Plan and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Responsible Procurement Plan the *Project Manager* replies within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*.

The Responsible Procurement Plan shall:

- describe the management processes and procedures for achieving compliance with each of the applicable Responsible Procurement objectives
- describe Equality and Diversity objectives and Supplier Diversity objectives;
- describe how the processes and procedures for achieving compliance with the Responsible Procurement requirements will be imposed in a relevant and proportional manner on subcontractors and suppliers ; and
- include supply chain risk assessments where there is a high risk of unethical labour practices.
- include a programme of activities to support the *Contractor's* Responsible Procurement Plan with proposed dates for commencement and completion, including but not limited to:

progress report submittal dates

progress meeting scheduled dates; and

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dates for site inspections and internal audits required to evidence progress achieved.

15.4 Responsible Procurement Requirements

15.4.1 Encouraging a Diverse Base of Suppliers

15.4.1.1 Supplier Diversity

Supplier diversity objectives shall form part of the *Contractor's* Responsible Procurement Plan and shall state the means by which the *Contractor* shall optimise supplier diversity and the participation of Diverse Suppliers in the supply chain for the contract through the use of SMART objectives. The *Contractor's* supplier diversity objectives shall as a minimum contain the following:

- awareness of Diverse Suppliers available to undertake work required within the contract and the *Contractor's* strategies to ensure that barriers preventing supplier opportunities are removed;
- the means by which subcontractors and suppliers will provide supplier diversity data to the *Contractor*,
- how baseline evaluation will be undertaken;
- how the composition of the workforce will be monitored every quarter;
- the processes that will ensure that Diverse Supplier involvement is optimised within the contract and outline procedures for monitoring progress towards the objective.

15.4.1.2 CompeteFor

In order to maximise the number and diversity of businesses contributing to the Programme, the *Contractor* shall use the CompeteFor web-sourcing portal to advertise all appropriate subcontractor and supplier opportunities which arise throughout the contract. The *Contractor* shall use reasonable endeavours to ensure that subcontractors and suppliers use the CompeteFor web-sourcing portal to advertise further opportunities within the supply chain.

The *Contractor* shall monitor the number, type and value of contract opportunities advertised and placed in its own supply chain.

15.4.1.3 Not Used

15.4.1.4 Meet the Contractor' Event

In order to support the *Employer's* commitment to encourage employment, training and subcontractor opportunities across the Programme, the *Contractor* shall host or attend one 'Meet the Contractor' event per calendar year.

15.4.2 Promoting Fair Employment Practices

15.4.2.1 London Living Wage

The *Contractor* shall pay its employees, and shall use reasonable endeavours to ensure that subcontractors and suppliers of any tier pay their employees, an hourly wage (or equivalent of an hourly wage) of not less than the London Living Wage (the basic hourly wage determined by the Greater London Authority (GLA) London Living Wage Unit) for any hours they work on the contract.

The *Contractor* shall audit the records of subcontractors and suppliers of any tier to ensure compliance with payment of the London Living Wage and notify the *Project Manager* of any non-compliance.

The *Contractor* shall allow access to its records, and shall use reasonable endeavours to procure that subcontractors and suppliers of any tier allow access to their records, to the *Project Manager* for the purposes of auditing compliance with the requirement to pay employees the London Living Wage.

In the event that the *Contractor* or *Project Manager* discover any non-compliance with this requirement, the *Contractor* shall co-operate fully with the *Project Manager* to resolve the non-compliance.

15.4.2.2 Equality and Diversity

The *Contractor* shall develop and implement Equality and Diversity objectives for this contract. The objectives shall form part of the *Contractor's* Responsible Procurement Plan.

The *Contractor's* Equality and Diversity objectives shall propose as a minimum describe how it will:

- actively engage and secure a long term relationship with the *Employer's* Jobs Brokerage;
- publicise vacancies in such a way that encourages applicants from protected groups or from deprived socio-economic backgrounds and adopts recruitment processes that ensure that all potential barriers to recruitment, particularly with regards to priority equality groups, have been removed;
- the *Contractor* shall encourage each of its Subcontractors to adopt and implement an equality and diversity policy which is at least as extensive in scope as the *Contractor's* equality and diversity policy.

- the *Contractor* shall include the methods by which the *Contractor* proposes to monitor and report on the implementation of its equality and diversity policy and its effectiveness.

15.4.2.3 Diversity Training

The *Contractor* shall develop and implement diversity training objectives and strategies to ensure that all personnel employed on the Site are trained appropriately for their role, and understand, the equality and diversity issues which may arise on Site. The objectives shall indicate the types and levels of training to be undertaken and how the training is to be monitored for its effectiveness.

The objectives should also identify those persons or organisations that will provide the training, the proposed content and the duration of the proposed training programmes.

Contractor's employees in managerial roles on Site shall receive managing diversity training, which shall provide clear guidance on anti-discriminatory practices within recruitment, training and appraisal.

15.4.2.4 The Diversity Works for London (DWFL) 'Gold Standard Diversity System'

The *Contractor* shall register on the Gold Standard Diversity System and shall use reasonable endeavours to work towards attaining the gold standard accreditation.

15.4.3 Meeting Strategic Labour Needs and Enabling Training Opportunities

15.4.3.1 Employment Opportunities

The *Contractor* (including subcontractors), shall use this jobs and skills brokerage service in the first instance to source all external labour and staff vacancies for this contract. The *Contractor* shall cooperate with the *Project Manager* in supplying details of employment opportunities to be advertised through this service in accordance with Appendix 15C.

The *Contractor* shall allow the jobs and skills brokerage service 2 working days to identify potential candidates for a role prior to sourcing candidates for the role through alternative means.

15.4.3.2 Labour and Skills Gap Analysis

This shall form part of the *Contractor's* Responsible Procurement Plan and shall detail the labour and staff needs and skills gaps identified by the *Contractor*. The *Contractor's* Labour and Skills Gap Analysis shall demonstrate as a minimum:

- (a) job roles, and personnel required to deliver the *works* (indicating those to be resourced in-house and those to be resourced through the supply chain);
- (b) labour and staff needs (how many vacant roles the *Contractor* anticipates will require to be resourced within each job role).

15.4.3.4 Strategic Labour Needs and Training (SLNT)

15.4.3.4.1 Strategic Labour Needs and Training (SLNT) objectives

The *Contractor's* SLNT objectives shall include as a minimum the following:

– delivery against the *Employer's* priority outputs defined in the table below including:

- the qualifications and training programmes identified;
- external funding streams identified to support the activity;
- assumptions made in delivery of the SLNT objectives

the *Contractor's* processes for ensuring the SLNT requirements will be met through the *Contractor's* Subcontractors including:

how SLNT considerations will be included in the selection, contracting and management of Subcontractors;

how Subcontractors will be made aware of Project and government support and funding streams for any SLNT activity to be undertaken

the *Contractor's* processes for monitoring and co-ordinating the delivery of its SLNT outputs which shall include:

details of the personnel responsible for implementing, managing and reporting SLNT activity within the *Contractor's* organisation;

the required administration, management and reporting structures;

how the *Contractor* will attract, develop and retain personnel with the skills (including numeracy and literacy) necessary to deliver the *works*

– the process for developing training plans for apprentices and trainees which shall include the following:

Strategic Labour Needs and Training Output Breakdown

The *Contractor* shall deliver the following minimum requirements for SLNT:

- one or more of the SLNT outputs in the equivalency table below for each three million pounds of the tendered total of the Prices (where the tendered total of the Prices is less than three million pounds, the *Contractor* shall pro-rata the requirement)e.g.. One Apprentice equates to 100 days of taster positions or one graduate or 200 days of placement positions.

Minimum requirements for SLNT

Crossrail Priorities (at least 50%)		Other outputs (50% or less)					
Apprentice (new)	Job Start	Graduate Training Scheme	Apprentice (existing)	Placement Positions (Nos)	Workforce Skills	Work Experience	
1	1	1	0.5	Min of 2 placement positions that add up to 200 working days in one year	Min of 100 days of workforce training or development activity in one year	Min of 2 work experience placements which add up to a minimum of 100 working days work experience in one year	

- The *Contractor* shall deliver a minimum of 50% of the above SLNT outputs in the following priority areas:

- Apprenticeship (new);

a value added apprenticeship that is contract specific and additional to the *Contractors* annual intake.

- Job Start;

a sustainable job start for an individual from the Local Community that is workless/ unemployed/ out of education or training;

a sustainable job start for an individual who has been long-term workless/ unemployed/ out of education or training for 6 months plus.

15.4.3.5 Crossrail Skills Pledge

The Contractor and subcontractors shall sign and comply with the 'Crossrail Skills Pledge' (Refer to Appendix 15B.)

15.4.6 Ethical Sourcing Practices

The *Contractor* shall ensure that in Providing the Works it complies with the following minimum requirements (derived from the Ethical Trading Initiative Base Code and shall use reasonable endeavours to ensure that subcontractors and suppliers comply with these minimum requirements.

- Employment is freely chosen:
 - There is no forced, bonded or involuntary prison labour; and
 - workers are not required to lodge "deposits" or their identity papers with their employer and are free to leave their employer after reasonable notice.
- Freedom of association and the right to collective bargaining are respected:
 - workers, without distinction, have the right to join or form trade unions of their own choosing and to bargain collectively;
 - the employer adopts an open attitude towards the activities of trade unions and their organisational activities;
 - workers representatives are not discriminated against and have access to carry out their representative functions in the workplace; and
 - where the right to freedom of association and collective bargaining is restricted under law, the employer facilitates, and does not hinder the development of parallel means for independent and free association and bargaining.
- Working conditions are safe and hygienic:
 - A safe and hygienic working environment shall be provided, bearing in mind the prevailing knowledge of the industry and of any specific hazards. Adequate steps shall be taken to prevent accidents and injury to health arising out of, associated with, or occurring in the course of work, by minimising, so far as is reasonably practicable, the causes of hazards inherent in the working environment;
 - workers shall receive regular and recorded health and safety training, and such training shall be repeated for new or reassigned workers;
 - access to clean toilet facilities and to potable water, and, if appropriate, sanitary facilities for food storage shall be provided;
 - accommodation, where provided, shall be clean, safe, and meet the basic needs of the workers; and
 - the company observing the code shall assign responsibility for health and safety to a senior management representative.

- Child labour shall not be used:

There shall be no recruitment of child labour;

Companies shall develop or participate in and contribute to policies and programmes which provide for the transition of any child found to be performing child labour to enable her or him to attend and remain in quality education until no longer a child; “child” and “child labour” being defined above;

Children and young persons under 18 shall not be employed at night or in hazardous conditions; and

These policies and programmes shall conform to the provisions of the relevant ILO standards.

- Living wages are paid:

- Wages and benefits paid for a standard working week meet, at a minimum, national legal standards or industry benchmark standards, whichever is higher. In any event wages should always be enough to meet basic needs and to provide some discretionary income;

- All workers shall be provided with written and understandable information about their employment conditions in respect to wages before they enter employment and about the particulars of their wages for the pay period concerned each time that they are paid; and

- Deductions from wages as a disciplinary measure shall not be permitted nor shall any deductions from wages not provided for by national law be permitted without the expressed permission of the worker concerned. All disciplinary measures should be recorded.

- Working hours are not excessive:

- Working hours comply with national laws and benchmark industry standards, whichever affords greater protection.

- No discrimination is practised:

- There is no discrimination in hiring, compensation, access to training, promotion, termination or retirement based on race, caste, national origin, religion, age, disability, gender, marital status, sexual orientation, union membership or political affiliation.

- Regular employment is provided:

To every extent possible work performed must be on the basis of recognised employment relationship established through national law and practice; and

Obligations to employees under labour or social security laws and regulations arising from the regular employment relationship shall not be avoided through the use of labour-only contracting, subcontracting, or home-working arrangements, or through apprenticeship schemes where there is no real intent to impart skills or provide regular employment, nor shall any such obligations be avoided through the excessive use of fixed-term contracts of employment.

- No harsh or inhumane treatment is allowed:
 - Physical abuse or discipline, the threat of physical abuse, sexual or other harassment and verbal abuse or other forms of intimidation shall be prohibited.

The *Contractor* shall manage and monitor adherence to these minimum requirements throughout its supply chain and report any non-compliance and remedial actions to the *Project Manager*.

The *Contractor* is required to comply with national and other applicable law and, where the provisions of law and these provisions address the same subject, the provision which affords the greater protection to the workers should be applied.

The *Contractor* shall undertake a risk analysis of its supply chain to identify any areas where unethical labour practices may occur. In the event that areas of high risk are identified by the *Contractor*, the *Contractor* shall detail in the Responsible Procurement Plan the action that will be taken to achieve compliance with the ETI Base Code. where high risks are identified the *Contractor* shall register with SEDEX and undertake social audits of production sites.

15.5 Monitoring, Reporting & Management

15.5.1 Responsible Procurement Progress Report

The *Contractor* shall submit a Responsible Procurement progress report to the *Project Manager* at the end of reporting periods one, four, seven and ten each year in accordance with the reporting period cut off dates.

The Responsible Procurement progress report shall be submitted in accordance with the template in Part 14.

The *Contractor* shall provide as much detail as possible, providing documentary evidence, where necessary, to support each statement made.

15.5.3 Responsible Procurement Progress Meeting

The *Contractor* and Subcontractors (where deemed required by the *Project Manager*) shall meet one week following receipt of the Responsible Procurement progress report to review Responsible Procurement activity.

15.6 Appendices

- Appendix 15A Labour & Skill Gap Analysis Template
- Appendix 15B Crossrail Skills Pledge
- Appendix 15C Crossrail Vacancy Template

Learning Legacy Document

Part 16 – Security

16.1 Not Used

16.2 *Contractor's* Main Responsibilities

The *Contractor* shall be responsible for providing security on the Site and in the Working Areas.

The *Contractor* proposes alternative security measures to the *Project Manager*, where it considers that the alternative security measures enhance security on the contract or Project.

16.2.1 *Contractor's* Security Manager

The *Contractor's* security manager shall be recruited from an appropriate background and shall:

- attend formal meetings, record discussions and actions and distribute minutes;
- as required with the *Project Manager*; and
- attend quarterly project-wide security meetings attended by other Crossrail contractors, the *Project Manager* and the *Employer*.

16.2.2 Security Guarding

The *Contractor* shall provide security guards and security management personnel to support the *Contractor's* security manager.

16.2.3 Security Interfaces

In order to ensure that the security interfaces between the main construction contracts are managed effectively for the Project, the *Contractor* is required to liaise and coordinate on security issues with Others (including other Crossrail contractors) through the *Project Manager*.

16.2.4 Principal Contractor

For Working Areas for which the *Contractor* is designated Principal Contractor the *Contractor* shall provide:

- control of site perimeters;
- security and control of access to security zones;

- site inductions for and issue permanent passes linked to a biometric access control system to all staff, to the *Employer, Project Manager, Supervisor* and Others at no charge to these parties;
- control of visitor access, parking and delivery and collection vehicles;
- periodic patrols and facilities for security personnel;
- signage and security surveillance; have available at all times the *Contractor's* security manager or nominated deputy to act as co-ordinator between the *Contractor, Others, the Project Manager* and the emergency services;
- maintain and provide on request up to date contact details including *Contractor's* security manager and nominated deputies and security managers of any relevant Others or subcontractors;
- ensure that Others are provided with contact details of the *Contractor's* Security Manager and nominated deputies;
- maintain an up to date record of the site plans;
- host and chair regular meetings with the *Employer's* project security manager, the *Employer's* security department and security managers from Others;
- liaise with the Others to ensure that electronic access control systems are compatible; and
- develop the procedures required to meet the obligations of this clause and included in the Security Manual and Incident Management Plan.

16.2.5 Security Arrangements with Others

For Working Areas where the *Contractor* is not the Principal Contractor the *Contractor* shall cooperate, liaise, coordinate and comply with the Principal Contractor's security arrangements and may be required to:

- have available at all times the *Contractor's* Security Manager or nominated deputy to act as co-ordinator between the *Contractor, the Principal Contractor, the Project Manager* and the emergency services;
- provide up to date contact details, including *Contractor's* Security Manager and nominated deputies, to the Principal Contractor;
- cooperate with the Principal Contractor in provision of records and evidence of checks pursuant to the issue of permanent passes
- provide up to date site plans to the Principal Contractor;
- attend regular meetings with the security manager from the Principal Contractor, the *Employer's* project security manager and *Employer's* security team;

- liaise with the Principal Contractor to ensure that electronic access control systems are compatible; and
- develop the procedures required to meet the obligations of this clause and included in the Principal Contractors security manual.

16.3 Contract Security Manual

16.3.1 Contract Security Manual

Within 4 weeks of the *starting date*, the *Contractor* shall produce a Contract Security Manual and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Contract Security Manual the *Project Manager* replies within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*. The Contract Security Manual shall set out the security procedures and the *Contractor's* proposals for meeting his security obligations. An accepted Contract Security Manual shall be in place prior to commencement of work on the Site and/or in the Working Areas.

The Contract Security Manual shall have the following headings and content:

- Index
- Organisation structure and establishment of site security guards and the role of the *Contractor's* security manager
- Access and egress control proposals
- Surveillance equipment
- Identification passes - staff, subcontractors and visitors including pass applications, vetting and authorisation procedures and issue and return of passes
- Site hoardings and fencing
- Position of designated car parks
- Perimeter lighting
- Control and movement of Equipment including transportation to and from the Site and/or the Working Areas and authorisation of removal
- Vehicle and person searches
- Protection and storage and control of explosive or dangerous materials.
- Protection of Equipment
- Protection of scaffold at high profile sites (Anti-terrorism requirements)

- Control and movement of Plant and Materials including transportation to and from the Site and/or the Working Areas and authorisation of removal.
- Security of tunnels and shafts
- Interfaces between contracts including handover procedures
- Construction railway operations
- Electrified track procedures
- Test run railway operations
- Site communication systems
- Site Safety Rules
- Disciplinary rules and procedures for breaches of security requirements.
- Induction process and records of induction.
- Procedures for ensuring persons and vehicles are directed to the correct destination.
- Working area plans showing the position of all fencing/hoardings, working area entrance/egress points, surveillance equipment, access control equipment, zoning security huts and any phasing requirements).
- Security guard histogram indicating location and number of guards required/proposed at Site entrance/egress points on a daily/shift basis.
- Procedure if security resources are temporarily required to assist Others when a Serious Security Incident is declared.
- Any other relevant subject.

The *Contractor* shall monitor his security activities against the requirements set out in the accepted Contract Security Manual, issue revisions to the Contract Security Manual when necessary, and in any case review the Contract Security Manual in full at maximum three monthly intervals. Any revisions to the Contract Security Manual shall be submitted to the *Project Manager* for acceptance.

16.3.2 Not Used

16.3.3 Not Used

16.3.4 Not Used

16.4 Control of Site Perimeters

The *Contractor* shall ensure that the Site and/or the Working Areas have perimeter security that prevents trespass whether accidental or deliberate. The perimeter fencing shall comply with the requirements of Works Information Volume 2B Part 17 Facilities and Services to be Provided by the *Employer* and the *Contractor*, and also the following:

Hoardings and fences shall run as straight as possible and be designed to avoid 'unobserved areas'.

Gates shall be designed to provide protection of at least the same degree as the perimeters. Gates will be lockable and be able to be opened or shut by one individual, quickly.

Hoarding and fences will be illuminated during the hours of darkness so that areas approaching the perimeters are easily seen in all restricted visibility conditions.

Where Working Areas are of a temporary nature and small in size, wire mesh fencing may be considered as a temporary perimeter security system providing it is supplemented with regular patrols by security guards.

Vehicular access shall be separated from pedestrian access and emergency exit gate(s) operable from the interior of the site shall be installed.

The *Contractor* shall limit entry to the Site and/or the Working Areas to authorised individuals only and shall:

- ensure all personnel working on the Project have successfully completed appropriate CSCS (Construction Skills Certification Scheme) training and/or other training to satisfy the other criteria as stated in Part 19 Health & Safety Management of Volume 2B of the Works Information;
- ensure that all personnel have attended site specific induction which will have a security awareness input;
- keep access gates secured when not in use;
- ensure security rated chains and padlocks are used;
- ensure site offices are alarmed where appropriate;
- establish a delivery control system;

- establish a locking up and opening procedure;
- keep materials, fuel, tools, IT server rooms and office IT Equipment secure at all times;
- ensure tower cranes have adequate physical and electronic measures to prevent unauthorised access;
- ensure scrap and waste materials are disposed of appropriately;
- ensure that the Site and/or the Working Areas, Equipment, and Plant and Materials are secure from use by unauthorised persons at all times; and
- ensure all the *Contractor's* employees including subcontractor and suppliers of any tier hold appropriate means of identification.

16.5 Security Zones

16.5.1 General

The Site and/or the Working Areas shall be divided into applicable security zones (the Zones) designed to limit the movement of individuals around the Site and/or the Working Areas and prevent unauthorised access to construction and restricted areas.

The *Contractor* shall propose the designated areas for each part of the Site and/or the Working Areas and obtain acceptance of the *Project Manager*.

It should be noted that *Contractor's* site offices and compounds located in particularly sensitive areas, or which have been identified as the target of high level threats, may require the introduction of additional security measures. The *Contractor* shall propose such additional measures where required and obtain the *Project Manager's* acceptance of his proposals

16.5.2 Security Zone 3

Security Zone 3 shall generally comprise administration areas (offices, parking areas etc. where no construction work is to be executed). Suitable demarcation shall be used to identify this Zone and the *Contractor* will make use of blue fencing or markings to visibly identify this area on site. Car parking shall also be controlled by security identifying a maximum car parking allocation where space permits.

16.5.3 Security Zone 2

Security Zone 2 shall generally comprise construction activity, storage and fabrication areas other than Zone 1 area. Suitable demarcation shall be used to identify this Zone and the *Contractor* shall use yellow fencing or markings to visibly identify this area on site. These are areas in which personal protective equipment is required to be worn.

16.5.4 Security Zone 1

Security Zone 1 shall generally comprise exclusion areas which may include restricted underground working areas, railway operational areas and facilities and defined storage areas for valuable and dangerous Plant and Materials and Equipment. Suitable demarcation shall be used to identify this Zone and the *Contractor* shall use red fencing or markings to visibly identify this area on site.

16.6 Access to Zones

16.6.1 General Access

General access to the Zones shall be restricted to authorised persons in possession of a valid pass and with the appropriate personal protective equipment.

Passes must be shown at all times when within the Site and/or the Working Areas and upon request by a uniformed security guard or any member of the *Project Manager's* team. The *Project Manager's* team will provide proof of their identity for this purpose.

No person shall receive a permanent security pass until they have attended the mandatory site induction and their pass application has been fully processed.

16.6.2 Control of Access/Egress (All Zones)

The *Contractor* shall propose the locations of the access/egress points which will be controlled by security personnel for acceptance by the *Project Manager*. The duration for which these access/egress point will be in use shall be included in such proposals.

The *Contractor* will screen all personnel in accordance with the *Employer's* screening policy to confirm the applicant's identity and right to work in the UK and where appropriate (i.e. sensitive posts) detect individuals who make false declarations about their records and detect individuals whose criminal records might preclude them from being engaged.

16.6.2.1 Access Control Equipment

The *Contractor* shall install an electronic card and biometric access control system which is capable of identifying individuals by matching their electronic card to their biometric data prior to permitting access to the Site and/or Working Areas. The *Contractor* shall submit his proposals for the acceptance by the *Project Manager*.

The electronic access control system shall:

- monitor personnel movements at all access/egress points to and from the Site and/or the Working Areas;
- provide the capacity for future Project wide expansion;

- utilise electronic readers installed at each accepted pedestrian access/egress point to provide an immediate and accurate record of all persons in the Working Areas at any given time;
- control pedestrian access/egress movements through full height turnstiles which shall form an integral part of the system;
- the physical entry barrier shall be suitable for outdoor use on a construction site;
- both access and egress through the physical barrier shall be controlled by a combination of Contactless Smartcard and biometric comparison.
- record and maintain the personal information supplied by individuals on their application for a security pass;
- record and maintain the details of the security pass issued including the photograph taken upon issue;
- be configured to enable legitimate enquiries to personal data records for the *Project Manager* and *Employer* to inform Project reports required by the *Employer*, Transport for London and other Project stakeholders from locations both within and outside the Working Areas;
- be accessible locally and remotely from either the *Employer's* site offices or head office; and
- provide data in a format compatible with the *Employer's* security systems.

The site electronic access control system shall be used by the *Contractor* to control all access-egress to/from the Zones and the *Contractor* shall allow for all necessary installation, maintenance, adaptation and removal when no longer required.

Under certain circumstances the *Project Manager* may accept that it is not practical to provide electronic control of access/egress. In such circumstances the *Contractor* shall propose alternative arrangements for acceptance by the *Project Manager* before works are commenced in the relevant Working Area.

Where access is not controlled electronically, passes shall be shown to an identified authorised person when entering or leaving the Working Area.

The *Project Manager* may use the data obtained from the electronic access control system to verify the *Contractor's* records of Defined Cost. The *Contractor* shall procure that such data may be used to verify Subcontractors and suppliers records.

Implementation of the access requirements within this section should be achieved within three months of the date of arriving on site unless the *Contractor* can demonstrate to the *Project Manager* that there will not be more than 30 staff or workers present at any time at an individual site.

16.6.2.2 Data Interface

The *Contractor* will work with the *Project Manager* to establish the process and technical method of delivery of data to the *Project Manager* and *Employer*.

The *Project Manager* will provide a template in which to submit the required information from the *Contractor* which may be updated from time to time. The *Contractor* shall provide information in accordance with the latest template provided by the *Project Manager*.

The system should be able to export data to the following formats:

- .xls
- .csv
- .MDB
- .Pipe (delimited)

16.6.2.3 Training

The access control system shall be intuitive to use by a range of different users.

The system data captured and logged shall be capable of being customised (by end users) in terms of input and reporting.

The *Contractor* shall provide training in the use of the access control system to all users of the system irrespective of their employing company.

16.6.2.4 Access Control - Interim Arrangements

During the initial phases of the contract and for periods where full security control has not been fully established on site, the *Contractor* shall ensure that accurate and up-to-date 'real-time' information on the *Contractor's* personnel working on site shall be provided to the *Project Manager*.

16.6.2.5 Access to Sites Controlled by Others

Where work is required to be undertaken on sites and/or assets under the control of Others, requests for access by the *Contractor* shall be arranged in accordance with the *Employer's* site access procedures. The following shall apply:

- the *Project Manager* shall forward to the *Contractor*, in relation to access to any site, requests for information on site risks and activities and shall advise any requirements or conditions relating to access in addition to any already set out in the Works Information;
- requests from the *Contractor* for access to sites controlled by Others must be accompanied by a method statement defining the safe system of work, for acceptance by the *Project Manager* before submission to Others for agreement;

- no entry is to be made onto these sites without the initial agreement of the *Project Manager*. Once consent for access is obtained, the *Contractor* is responsible for notifying and agreeing with Others the timing of proposed visits; and
- no entry shall be made onto Others sites without appropriate induction, training and competence checks.

More detailed requirements relating to access to specific sites owned or controlled by Network Rail, London Underground or Docklands Light Railway are provided in Parts 10, 11 and 12 respectively of Volume 2B of the Works Information.

16.6.3 Records of Access/Egress

The *Contractor's* security arrangements shall incorporate a system of monitoring all personnel entering and leaving the Zones. This system shall ensure that:-

- all persons are authorised to enter the Zone they are accessing;
- all persons have received training and/or induction appropriate to the Zones they are accessing or are escorted or supervised by suitably qualified persons;
- all persons are equipped with working designated safety Equipment;
- details and times of entry and exit are recorded by the electronic access control system enabling the number and identity of persons in the Zone to be ascertained at any time;
- all access and egress attempts (successful or unsuccessful) shall be recorded including biometric and smartcard details;
- the system shall not allow persons with an expired Contactless Smartcard to access or egress the Working Areas;
- the system shall allow the *Contractor* to suspend access to persons and record a reason for such suspension. Such suspension shall be able to include an automatic time limit; and
- the system shall allow for a persons access to be automatically suspended should relevant qualifications expire.

Individual movements in and out of the Zones must be recorded by card and/or proximity readers activated by appropriately encoded personal identity passes/swipe cards. This shall cater for visitors and short term Subcontractors with authority levels restricted to an appropriate hourly or daily basis.

16.6.4 Access/Egress Locations of Underground Areas

Access in and out of tunnel workings and long stretches of completed cut and cover tunnels shall be controlled by dedicated upgraded extensions of the *Contractor's* site

electronic access control system. The system is to be programmed to alert and record any incident or attempt of unauthorised access.

16.6.5 Searches

The purpose of searching is to prevent loss or fraud and to detect excluded items. Examples of excluded items include but are not necessarily limited to:

- stolen property
- drugs
- alcohol
- explosives
- firearms and/or component parts
- offensive weapons
- protestor materials; and
- professional recording equipment

Personnel working anywhere within the Site and/or the Working Areas may be subject to random searches conducted by the security staff upon the directions of the *Contractor*. This may include all persons and vehicles entering or leaving the Working Areas.

The *Contractor* must ensure that failure to permit such a search upon reasonable request will be a disciplinary offence. Passes shall be withdrawn on a permanent basis from persons refusing to co-operate with reasonable requests for search.

Personal searches will be confined to bags and equipment. Under no circumstances shall the *Contractor* permit security staff to conduct contact body searches, and if circumstances deem such action, the matter may be brought to the attention of the police.

16.6.6 Not Used

16.7 Permanent Passes

16.7.1 Pass Issue

The *Contractor* shall be responsible for the issue and withdrawal of permanent photographic security passes.

The Contractor and all levels of subcontractor personnel shall only be issued with permanent security passes after they have passed the appropriate background

screening checks carried out by the *Contractor* and forms recording the following information have been completed:

- Name of person;
- Gender;
- Disabilities;
- Ethnic origin;
- Age (based on ranges);
- Proof of right to work in the UK;
- Proof of identity;
- Home address and postcode and proof of address;
- Local self declaration re criminal record;
- Pass number;
- Employer;
- Employee status (direct/agency/self employed);
- Confirmation of remuneration above London Living Wage;
- Job Description and position;
- Previous employment status and project prior to Crossrail;
- National Insurance number;
- Training received and qualifications gained;
- Construction Skills Certification Scheme (or acceptable affiliate or amalgamated scheme) card number;
- Underground Safety Passport number;
- Professional referee (not from existing employer);
- Personal reference (not another pass holder);
- Areas of access permitted;
- Expiry date of pass;

- Record of induction;
- Record of railway infrastructure access cards and training; and
- Apprenticeships:
 - Unique Apprentice Identifier Number;
 - Apprentice date of birth;
 - Occupation;
 - Apprenticeship Framework;
 - Start date with Employer;
 - Start date on apprenticeship;
 - Your first assignment;
 - Transferred to work on the Crossrail development; and
 - Name of training provider or college.

Pass issuing and validation Equipment shall be procured and installed by the *Contractor*.

Passes shall be provided by the *Contractor* for the *Employer's* and *Project Manager's* personnel on the written request from the *Project Manager*. Visitors will be issued with a temporary pass.

Applicants for permanent security passes must collect and sign for passes in person from a designated office within the *Contractor's* accommodation.

The *Contractor* shall liaise with the *Employer* and other Crossrail contractors to enable multiple sites to be included onto a single pass. The control and issue of authorisation for each contractor's site remains with the respective contractor irrespective of who has issued the original or base pass. The *Contractor* shall ensure that confidentiality of information is appropriately maintained according to UK law. Site access log and enrolment details should be retained for at least 7 years. The *Contractor* will ensure the Integrity of the information retained.

16.7.2 Pass Application

Screening checks on applicants shall be the responsibility of the *Contractor*. The *Contractor* shall retain related records on site which shall be made available to the *Project Manager* within 24 hours following written request. If proper records are not made available the applicant or pass holder will not be permitted further access to the Site and/or the Working Areas.

The *Project Manager* may audit the *Contractor's* pass issuing process at all reasonable times.

16.7.3 Format for Passes

All passes will indicate the category of the pass-holder as set out below and the areas to which access is permitted. The passes shall be capable of being read electronically.

Passes shall clearly indicate:

- Name of Pass-holder;
- Pass Number;
- Employer;
- Photograph of Pass-holder; and
- Expiry Date.
- Passes will differentiate between:
 - *Employer's* personnel (this includes *Project Manager's* personnel);
 - *Contractor's* direct employees;
 - Subcontractors;
 - Others; and
 - Different Zones.

The format for the passes will be provided by the *Project Manager*.

16.7.4 Pass Return

The *Contractor* is responsible for ensuring passes issued to the *Contractor's* workforce (including subcontractors) are returned when no longer required or upon expiry (whichever comes first) and that a list of lost permanent passes is maintained.

16.8 Visitors

16.8.1 General

Any persons attempting to gain access to the Site and/or the Working Areas by vehicle or on foot who do not at the time have in their possession a valid permanent security pass shall be treated as a visitor. All visitors shall be escorted or supervised at all times by a permanent pass-holder whilst in the Site and/or the Working Areas. No more than four visitors are to be escorted or supervised by a single permanent pass holder at any time.

The *Contractor* shall maintain a log of all visitors including:

- Name;
- Employer;
- Nature of business;
- Time in;
- Time out; and
- supervisor/escort name including signature.

16.8.2 Temporary Passes for visitors

The *Contractor* shall issue all visitors with temporary passes and details of relevant written health and safety site rules. The *Contractor* will ensure that sufficient copies of the health and safety rules are available for issue to visitors before they enter the Site and/or the Working Areas for the first time.

Visitors shall receive a temporary pass with a maximum 24 hour duration and the expiry date or time shall be clearly indicated.

The *Contractor* is to ensure that all temporary passes are returned when the visitor leaves the Site and/or the Working Areas and that a list of lost passes is maintained.

16.9 Communications

The *Contractor* shall procure and install a radio communication system to a specification accepted by the *Project Manager*. The radio communication system shall be capable of operating both on site and in the immediate vicinity.

16.10 Parking

Access to the Site and/or the Working Areas and the available area on sites is restricted such that generally parking in the Site and/or the Working Areas shall be prohibited. Should the *Contractor* require parking to be allowed within the Site and/or the Working Areas, it shall submit proposals for acceptance by the *Project Manager*.

Where parking is accepted by the *Project Manager*, only authorised vehicles will be allowed to park in the Site and/or the Working Areas. All vehicles parked in the Site and/or the Working Areas shall display a valid car park pass and shall only be parked in authorised areas. Passes will be provided by the *Contractor* and issued upon receipt of an accurate completed application form, duly authorised by the *Contractor*.

Car park passes will bear allocation numbers and expiry dates and in view of local sensitivities may, if required by the *Project Manager*, be printed in covert form.

The *Contractor* shall ensure that vehicles improperly parked or not displaying a valid pass are removed.

16.11 Delivery or Collection Vehicles

Written security logs of all delivery and collection vehicles entering and leaving the Site and/or the Working Areas are to be maintained by the *Contractor* and made available to the *Project Manager* for inspection upon request. Delivery vehicle reception facilities are to be separately designed to provide a secure environment that deters unauthorised loss or fraudulent activity. This system shall operate in conjunction with the Traffic Coordination Centre to ensure only authorised and planned vehicles arrive in the Site and/or the Working Areas. Vehicles are liable to be searched on entering or leaving a site.

A vehicle control access point shall be established that allow vehicles entry but also allows for vehicles to be refused site access and returned to the highway without causing obstruction or delay.

The delivery and collection security logs shall include:

- Name of haulier;
- Vehicle registration number;
- Description of Equipment and Plant and Materials being collected or delivered;
- Driver's name and signature;
- *Contractor's* order number;
- Site and/or the Working Areas visited;
- Instructions for collection or delivery;
- Date; and
- Time (to be recorded by the *Contractor*).

The *Contractor* shall prepare procedures for acceptance by the *Project Manager* to ensure only authorised vehicles are admitted to the Site and/or the Working Areas.

16.12 Zone Boundaries

The *Contractor* shall provide and maintain adequate and separate vehicular and pedestrian access at each Zone boundary with adequate fences and barriers. The *Contractor* shall submit his proposals to the *Project Manager* for acceptance.

16.13 Periodic Patrols

During site working hours and also when the Site and/or the Working Areas are closed, the *Contractor* shall ensure that periodic security patrols are carried out. These patrols shall:

- conduct random checks to ensure that only authorised persons are present in the Working Areas;
- conduct random checks on fences and hoardings and associated lighting facilities, and report any deficiencies where necessary they are authorised to conduct these patrols externally but as a general principal no external guard patrols are permitted without the acceptance of the *Project Manager*.
- not be permitted to use guard dogs as a security measure without the acceptance of the *Project Manager*
- conduct random checks on vehicles that are parked in authorised parts of the Working Areas; and
- be recorded and undertaken by two guards where appropriate and ensure that guards are in radio communication with each other at all on duty times.

The *Contractor* shall supply 'proof of presence' reports to evidence patrols have taken place; and

The *Contractor* shall ensure suitable guard assignment instructions and risk assessments have been completed.

The *Contractor* will be responsible for effecting prompt repairs and maintenance to fences and hoardings and lighting.

16.14 Facilities for Security Personnel

The *Contractor* shall provide adequate facilities and services for security personnel as follows:

Security accommodation at each manned site access/egress point or adjacent to any barrier control. The accommodation should provide good visibility of the immediate area and be approved by the security manager;

The accommodation shall be equipped with a telephone and fitted out in accordance with Health and Safety Regulations, and include heating, ventilation, lighting and power points; and

Toilet and washing facilities should be sited within reasonable distance from the security accommodation.

16.15 Signage and Security Surveillance

16.15.1 Signage

The *Contractor* shall supply and install all the suitable signage relating to access, security and safety requirements.

16.15.2 Security Surveillance

The *Contractor* shall provide and install a CCTV system with cameras positioned to monitor all Site and/or the Working Areas perimeters and the movements of vehicles, materials and persons entering or leaving the Site and/or the Working Areas. The system shall be monitored with cameras triggered by security alarms and on site by security specialists who are enabled to initiate security response to incidents. The *Contractor* shall propose for acceptance by the *Project Manager* the positions and types of camera and the method of logging and storing information. The *Contractor* shall ensure that the functionality of the CCTV system enables the *Employer* to obtain remote access to real time data and where instructed by the *Project Manager* centralised control of the system shall be passed to the *Project Manager*. The *Contractor* shall ensure that any CCTV system installed complies with all relevant current legislation.

16.16 Not Used

16.17 Information Security

The *Contractor* shall provide and maintain security of Project information as set out in Works Information Volume 2B Part 17 Facilities and Services provided by the *Employer* and the *Contractor*.

Part 17 – Facilities and Services

17.1 Introduction

This part of the Works Information describes the responsibilities of the Parties for the provision of facilities and services to support the construction and management of the *works*.

The *Contractor* shall provide all construction facilities and services required to properly support activities and operations required for the provision of the *works*. The *Contractor* shall remove all facilities and services provided by the *Contractor*, on or, as appropriate, before Completion of the *works*.

This part of the Works information has been separated into the following sub-parts:

- facilities and services to be provided by the *Employer* for use by the *Contractor*,
- facilities and services to be provided by the *Contractor* for use by the *Employer*,
- other facilities and services to be provided by the *Contractor* for his own use;
- support services to be provided by the *Contractor*, and
- removal and/or handover of facilities and services.

17.2 Facilities and Services to be Provided by the *Employer* for Use by the *Contractor*

17.2.1 General

The *Contractor* shall have the use of the facilities and services provided by the *Employer* to Provide the Works and shall be responsible for maintaining these facilities until Completion.

Some of the facilities provided by the *Employer* will be in a “used” condition having been utilised by earlier Project contractors. The *Contractor* shall be deemed to have inspected these facilities and to have satisfied himself of their condition. The *Contractor* shall be responsible for any renewal and refurbishment required to bring these facilities to a condition suitable for their purpose.

17.2.2 IT Services

The *Employer* shall provide the *Contractor's* authorised personnel with user accounts to access the *Employer's* hosted web servers used for contract communications.. The *Employer* will pay for licences to use the bespoke software that the hosted web servers require. The *Contractor's* authorised personnel will be

able to access the hosted web servers from any internet enabled computer that the *Contractor* provides for its own use.

17.3 Facilities and Services to be Provided by the *Contractor* for Use by the *Employer*

17.3.1 General

In addition to the provision of facilities and services for his own use, the *Contractor* shall provide facilities and services for use by the *Employer*.

17.3.2 Temporary Office Location

If required the *Contractor* shall provide temporary office space for the use of the *Employer* prior to the on Site accommodation being available. The location of any temporary office is to be proposed by the *Contractor* for acceptance by the *Project Manager*.

The *Contractor* shall provide the facilities and services at the temporary office location in accordance with the requirements detailed below in 17.3.3 to 17.3.6 inclusive.

17.3.3 Office Accommodation, Furnishings and Equipment

The office accommodation provided is to be combined with the *Contractor's* own accommodation and shall be available for occupation within four weeks of the commencement of works on the Site.

The *Contractor* shall submit to the *Project Manager* for acceptance the proposed location and arrangement of the office accommodation showing how this accommodation will be combined with his own.

Minimum standards of the decorative finish to offices, planned wiring layouts, communications / computer room, air conditioning and power supply are set out in Appendix 17A. Detail of the proposed accommodation shall be accepted by the *Project Manager* before the *Contractor* starts any mobilisation activities. The *Contractor* shall clean all office accommodation and maintain it in good decorative order until Completion.

17.3.4 Building and Utility Services

The *Contractor* shall supply and install all required building and utilities services to the *Employer's* accommodation. These services shall include:-

- electrical power and lighting;
- potable water;
- heating;
- air conditioning;

- telephones;
- wastewater and surface water drainage;
- ISDN line for internet; and
- alarm systems.

17.3.5 Office Consumables

The *Contractor* shall provide office consumables for the *Employer* including:

- cartridges, toner and consumable parts for plotters, printers and photocopiers;
- paper of various standard sizes for plotters, printers and photocopiers;
- storage boxes and archive supplies;
- filing supplies (lever arch files, file dividers, etc);
- stationery for general use (for example heavy duty hole punches, heavy duty staplers and comb binding machines);
- stationery for individual use (for example lighter duty hole punches, staplers, pens, pencils, tags, paper pads, notebooks, repositionable notes, etc); and
- replacement parts and batteries for office Equipment.

17.3.6 Radio Communications

The *Contractor* shall propose the number of radio channels and frequencies required for the *Project Manager's* acceptance.

17.3.7 IT Facilities and Telephones

The *Contractor* shall provide the following IT facilities;

- internet connectivity from the *Contractor's* network to the *Employer's* network for use by the *Contractor* and the *Employer*. The internet connectivity shall be a minimum of 100 Megabit for Sites and Working Areas where the peak number of users (*Contractor's* and *Employer's* people and Others combined) is estimated to be more than 50. For Sites and Working Areas where the peak number of users (*Contractor's* and *Employer's* people and Others combined) is estimated to be between 11- 49 a minimum of 50 Megabit internet capacity should be provided. For Sites and Working Areas where the peak number of users (*Contractor's* and *Employer's* people and Others combined) is estimated to be 10 or less a minimum of 24 Megabit internet capacity should be provided. The *Contractor* shall consider the access required by users of the *Contractor's* and *Employer's* systems and the activities to be performed on the Site and the

Working Areas and if required provide a higher internet capacity regardless of the number of users;

- all LAN Equipment including switches, routers and structured cabling;
- 3 x RJ45 connection points per *Employer's* person;
- any access to the *Contractor's* systems as required by the *Employer*

as part of the accommodation to be provided for the use of the *Employer* provision of a secure air conditioned computer room, with:

- a minimum size as stated in Volume 2A of the Works Information;
- a power supply that is on a separate ring to the main block;
- minimum 12 x power outlets and 12 x RJ45 outlets;
- an Uninterruptible Power Supply (UPS) to cover the whole computer room; and
- air-conditioning by floor or roof mounted units to provide ambient conditions temperature 16 to 26 degrees celsius, relative humidity 20% to 80% non condensing;

The *Employer* shall provide the following IT facilities at site for its own use:

- all desktop or laptop machines; and
- all printers, scanners, plotters and facsimile machines.

The diagram below illustrates the division of responsibilities between the *Employer* and *Contractor* to provide IT facilities at the worksites:

17.3.8 Information Security and Electronic Data Transfer

Within 4 weeks of the *starting date*, the *Contractor* shall produce an Automation Plan and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Automation Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses to the Automation Plan shall be made within the *period for reply*.

The Automation Plan shall include:

- definition of Site and Working Areas IT requirements;
- hardware to be used;
- details of the software and standard data formats used for electronic files;

- data transfer and collaboration tools;
- information security plan including details for applying the standards of ISO 27001 for information security management;
- IT training plan; and
- overall Site network strategy with site diagram.

17.3.9 Information Security and Electronic Data Transfer

17.3.9.1 Information Security Policy

The *Employer* is committed to ensuring that appropriate policies are in place to manage and protect the information assets of the contract and achieving best practice as identified in ISO 27001. For the purpose of this part of the Works Information, information includes, as a minimum, all data stored on computers, transmitted across networks, printed out or written on paper, sent out by fax, stored on disk, tape and other electronic media or relayed by voice. All information that is created, processed, stored or transmitted (physically or electronically) during the course of the Project is an asset and as such is governed by these requirements.

It is the responsibility of the *Contractor* to:

- provide adequate protection for all of the *Employer's* information;
- use all reasonable endeavours to ensure that subcontractors and suppliers and Others provide adequate protection for all of the *Employer's* information; and
- provide protection commensurate with the risks identified and in accordance with UK government standards for information protective security.

To comply with the information security policy the *Contractor* shall:

- establish and enforce company, departmental or agency information security policies in a manner consistent with this policy statement;
- maintain an internal organisation to oversee and manage information security;
- ensure that risks are reduced to an acceptable level by applying protective controls which are based on risk assessment and the protective marking of the information, and which conform to appropriate baseline controls;
- when assessing the protective requirements for company information, consider the three security objectives of confidentiality, integrity and availability;
- limit access to information and other assets to those whose duties require it and who have the necessary authority and security clearance;

- when transmitting protectively marked information in any form, do so in ways that reduce to an acceptable level the risk of compromise by unauthorised interception, modification or disruption;
- ensure that personnel have an appropriate awareness of information security policy and practice to the extent that their duties require, and fully understand their responsibilities (including legal obligations);
- regularly monitor and review information security arrangements to ensure that policy, standards and procedures remain relevant and effective; and
- ensure that their subcontractors and suppliers and the external parties with whom they deal are aware of the need to take the measures described above and wherever practicable ensure that such measures are taken.
- If access is required via an external PC to the *Employer's* hosted systems, the PC shall have appropriate virus protection. The *Employer* deems appropriate virus protection to be, 'Anti-Virus program no older than 2 years in terms of version, that the virus pattern is updated at least every 30 days and is in support by the developer throughout the duration of access. The Anti-Virus program should be set to on demand scan for any non-permanent storage such as "USB sticks / external hard drives" so that a full scan of that entity is completed automatically when attached to the main system.' Any file that is to be transferred to the *Employer* shall be scanned for viral and malware threats prior to uploading to the *Employer's* hosted systems.

The *Contractor* will be audited by the *Project Manager* for compliance with these requirements.

The *Contractor* shall have use of the *Employer's* IT systems. It is the *Contractor's* responsibility to ensure compatibility between the *Contractor* and *Employer* IT systems.

17.3.9.2 Data Transfer Methods

Drawings, CAD Data, setting-out data, correspondence, reports, financial cost data, risk register data, images and construction programmes shall be transferred electronically. The *Contractor* shall provide access to any progress records required by the *Employer*.

The method of transferring data shall be defined by the *Project Manager*.

17.3.9.3 Data Transfer Formats

The standard data formats used by the *Employer* are as follows. The software version of the format (where applicable) is given along with the default file extension. Further information on the definition of the formats or on compatibility with other software systems can be obtained, on request, from the *Project Manager*:-

Drawings	Adobe (.pdf)
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CAD Data	V8i (.dgn)
Reports, Correspondence	Microsoft Word (.doc)
Spreadsheets	Microsoft Excel (.xls)
Databases	Microsoft Access (.mdb)
Images	TIFF (.tif) or JPEG (.jpg) Adobe (.pdf)

The *Employer* will only supply data to the *Contractor* in the formats specified above. Where the *Contractor* translates data to an alternative format it is the responsibility of the *Contractor* to verify the accuracy of the translated data.

The *Contractor* shall only supply data to the *Project Manager* in the formats specified above, unless otherwise agreed with the *Project Manager*. All CAD Data submitted shall be required to meet the *Employer's* CAD Standard. From time to time the *Project Manager* shall update the standard data formats as required. The *Contractor* shall be notified and expected to transfer data using the new format.

17.4 Other Facilities and Services to be Provided by the *Contractor*

17.4.1 General

The *Contractor* shall provide all other facilities and services required to Provide the Works. These facilities shall comply with all relevant statutory regulations and recognised industry standards and shall include, the requirements described below and as stated in Appendix 17A to this part of the Works Information.

17.4.2 Temporary Buildings

The *Contractor* shall provide all temporary accommodation necessary to Provide the Works including:

- offices;
- secure storage facilities;
- workshops;
- appropriate welfare facilities, including canteens, toilets, showers, locker rooms and drying rooms; and
- first aid and medical facilities.

The *Contractor* shall connect all temporary accommodation to mains services and drainage.

17.4.2.1 Notices and Signage

The *Contractor* shall supply and install all statutory, corporate and security signage.

No other signs/advertisements including subcontractors name-boards, hoardings or bill posting shall be permitted on or around any part of the Site or the Working Areas, without prior acceptance of the *Project Manager*.

17.4.2.1.1 Statutory Signage

Signage that is required by, and complies with, relevant and current statutory and local authority requirements.

17.4.2.1.2 Not Used

17.4.2.1.3 Security Signage

The *Contractor* shall provide and install all necessary security signage as part of his security obligations (refer also to Part 16 of Volume 2B of the Works Information).

17.4.3 Not Used

17.4.4 Not Used

17.4.5 Testing Facilities

The *Contractor* shall provide all testing facilities necessary to Provide the Works.

Testing facilities shall be capable of, but not be limited to, the provision of the following services:

- materials testing;
- environmental testing; and
- specific Equipment testing.

17.4.6 Site Layout and Facilities

The *Contractor* shall ensure that site layout and appearance is designed, established and maintained such that:

- the Sites and the Working Areas are contained and limit the visual intrusion of *works* on nearby residents and users of local facilities and amenities;
- activities are screened to protect nature conservation sites and the amenity value of recreational facilities;
- storage sites, fixed plant and machinery, Equipment and temporary offices shall be located to limit environmental impacts and have due regard to neighbouring accommodation;
- security cameras shall be sited and directed so that they do not intrude into occupied residential properties; and

- where practicable, site Equipment and facilities shall be powered from mains electrical sources, diesel powered generators shall only be used where the *Contractor* demonstrates it is impractical to use mains power and with the *Project Manager's* acceptance.

The *Contractor* shall ensure that refuelling of tanks, vehicles, plant and equipment is undertaken as follows:

- all fuel tanks shall drain to an area which drain to foul sewer via an oil interceptor;
- all refuelling shall be constantly supervised by named individuals, competent and trained in the pollution risks of fuel, control measures and spill response; and
- all areas where fuel is stored or used shall have spill kits located adjacent with additional spill kits for use in the event of a major spill readily available in the stores.
- The *Contractor* shall implement and enforce a good housekeeping policy on the Site and the Working Areas to ensure that they are clean, tidy and safe. The *Contractor* shall provide effective preventative pest control and prompt treatment of any pest infestation.

17.4.7 Fencing and Hoarding

The *Contractor* is responsible for the detail design and installation of the hoardings and fencing, and for ensuring that they are fit for purpose

The *Contractor* submits proposals for the design and construction of any hoardings to the *Project Manager* for acceptance prior to commencing installation. The design process shall consider all relevant dead and imposed loading on the hoardings, including pressure generated by passing traffic or trains.

The *Contractor* adopts and adapts any hoardings provided by the *Employer* and completes any work required to ensure they comply with the above standards and maintains them until Completion.

The *Contractor* shall display notices on all site boundaries to warn of hazards on site such as deep excavations and construction access.

Hoarding and temporary lighting on or near railway property / infrastructure must be planned with guidance and approvals from the infrastructure owner and maintainer and comply with the standards of the property owner or controller.

17.5 Support Services to be Provided by the *Contractor*

17.5.1 General

The standard of support services to be provided by the *Contractor* and the cleanliness and tidiness to be maintained on the Site and the Working Areas is to be in accordance with Crossrail Baseline Standards and industry best practice.

17.5.2 Facilities Operation and Maintenance

17.5.2.1 General

The *Contractor* shall operate and maintain the following construction facilities:

- facilities and services provided by the *Contractor* for his own use and facilities for use by the *Employer*, and
- any facilities and services, where relevant, previously established by Others which have been assigned to the *Contractor* by the *Employer*.

When entering into service contracts for specialist facilities, such as security and fire alarm systems, heating and ventilation systems, fire fighting systems etc, the *Contractor* shall ensure that such service contracts give the *Contractor* the right to assign the contract without consent to the *Employer* or its nominee upon Completion where the facilities are to remain on the Site or the Working Areas..

The *Contractor* shall make arrangements for ensuring adequate supply and maintenance of utilities to the *Project Manager's* satisfaction.

The *Contractor* shall supply sufficient chilled water, ground and instant coffee, tea bags, milk and sugar, plus the serviced facilities to obtain these beverages for all users of the accommodation.

17.5.2.2 Not Issued

17.5.2.3 Survey and Measurement Equipment

The *Contractor* shall supply, maintain, calibrate and make available to the *Project Manager's* personnel survey and measurement equipment for the purposes of monitoring site conditions and monitoring the *Contractor's* setting out, site measurements and construction tolerances. Such equipment shall be of a quality and accuracy appropriate to its intended use on this project.

This equipment shall include, but not be limited to:

- topographic survey Equipment (autolevel, total station, c/w all accessories etc.);

- environmental survey Equipment (gas detector, etc.);
- structural survey Equipment (concrete cover meter, etc.);
- cable detection meter; and
- tape measures, staffs, sights and other items of survey Equipment

17.6 Removal and/or Handover of Construction Facilities and Services

17.6.1 General

The *Contractor* shall remove all construction facilities and services upon Completion of the *works*. This shall include all facilities provided by the *Contractor* for his own use and for use by the *Employer* and other facilities previously used by earlier Crossrail contracts and subsequently assigned to the *Contractor*.

17.6.2 Not Used

17.7 Appendices

Appendix 17A Specification for *Employer's* Accommodation and other accommodation

Part 18 – Traffic Management

18.1 Introduction

During the passage of the Crossrail Act 2008, the *Employer* made commitments within the Environmental Statement and associated Environmental Minimum Requirements regarding the traffic management associated with the *works*. This part of the Works Information describes the *Employer's* Traffic Management function and the constraints on how the *Contractor* Provides the Works arising from the commitments made by the *Employer*.

18.2 Not Used

18.3 The *Contractor's* Responsibilities for Traffic Management

18.3.1 General

The *Contractor* is responsible for the planning and implementation of the TMS and TMO for the *works* including:

- all necessary consents and approvals.
- all traffic management activities within the Site and Working Areas and control of access to and egress from the Site and Working Areas;
- all traffic management activities around the Site and Working Areas to allow construction of the works;
- the coordination of all its traffic management activities with others, including other Project contractors; and
- so far as reasonable practicable, maintaining existing public routes and rights of way and providing signposted alternative routes if not feasible;
- so far as reasonable practicable minimising disruption to traffic.

18.3.2 Legislation and Guidance

Schedules 2, 3 and 17 Part 1 of the Crossrail Act 2008 amend the standard legislation relating to traffic management.

Parts of the New Roads and Streetworks Act 1991 are disappplied by the Schedule 14 and Schedule 17 Part 1 of the Crossrail Act 2008.

The *Contractor* shall note that where a LHA has introduced a permit scheme to replace the New Roads and Streetworks Act noticing system, Project works are exempt from the provisions of the scheme, other than notifications.

Where a permit scheme is in operation, the *Contractor* shall submit, after liaison with the *Project Manager*, either notices required under the NRSWA or an equivalent

provisional advance authorisation under the provisions of the permit scheme as determined by the *Project Manager* or other equivalent notification as specified by the *Project Manager*.

The *Contractor* shall ensure that its TMS and TMO complies with all statutory requirements, standards and advice, current at the date of the execution of the TMO, including but not necessarily limited to:

- Safety at Street Works and Road Works – Code of Practice issued by the Department of Transport;
- Traffic Signs Manual Chapter 8 Roadworks and Temporary Situations Part 1: Design and Part 2: Operations;
- Traffic Signs Regulations and General Directions 2002; as amended from time to time.

18.4 ***Contractor's Traffic Manager***

The *Contractor* shall appoint a Traffic Manager.

The Traffic Manager shall:

- develop and implement the TMS and TMO and the Traffic Management Plan for the *works*;
- develop and provide traffic management training for all personnel;
- manage all traffic management personnel;
- co-ordinate traffic management activities;
- co-ordinate with Others to manage and reduce the combined effect of TMSs;
- produce report/ information for the traffic management part of the progress report and attend the progress meeting to ensure that the Traffic Management Plan remains suitable, adequate and effective; and
- be the main traffic management contact with the *Project Manager*.
- The Traffic Manager shall have the following competencies, experience and qualifications:
 - appropriate experience of traffic management on construction projects including site experience;
 - good knowledge and practical experience of legal traffic management requirements and how to comply with them;
 - good knowledge and practical experience of planning and implementing TMSs;
 - experience of liaison with stakeholders including statutory bodies such as LHAs, the Highways Agency and the metropolitan police and other police forces; and

- experience of obtaining and complying with traffic consents including Traffic Management Act Notifications, TRO and traffic signal orders.

18.5 Traffic Management Plan

Within 4 weeks of the *starting date*, the *Contractor* shall produce a Traffic Management Plan setting out how highways and traffic shall be managed for acceptance by the *Project Manager*. In the case of the first submission of the Traffic Management Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*. The *Contractor* shall not commence the work on site until the *Project Manager* has accepted the Traffic Management Plan.

The Traffic Management Plan shall include all tasks required to comply with all legal and contractual requirements relating to highways and traffic management for the works. The Traffic Management Plan shall include the nominated person responsible for each task and a single individual responsible for overall production, implementation and update of the plan. The Traffic Management Plan may include existing corporate procedures, plans or other documents provided that these meet legal and contractual requirements. The Traffic Management Plan shall include:

- the roles and responsibilities the *Contractor's* traffic management personnel;
- the procedures for liaising with Others, such as LHAs
- the management processes for inspection, maintenance and review of the TMOs
- the strategy for how traffic shall be managed for its Site and Working Areas that affect the highway.
- the *boundaries of the site* and the main access/egress points;
- any temporary and permanent closures and diversions of highways and public rights of way;
- the location of surveys to be undertaken to establish the condition of the highway prior to the commencement and after the completion of the works affecting the highway;
- details of the timing of any works affecting the Highway and programme;
- identification of required highways consents, TROs etc; and
- identification of any relevant undertakings and assurances.

18.6 Not Used

18.7 Meetings and Liaison with Others

18.7.1 Traffic Liaison Groups

The *Contractor* shall participate in Traffic Liaison Group meetings with LHAs, TfL ST, other the police, bus operators, taxi trade representation, and other emergency services. At these meetings, the *Contractor* shall present proposals for future works affecting the highway including methods of construction, and proposed programme, and facilitate a review of the associated traffic management requirements. The *Contractor* shall aim to achieve concurrence on the TMS prior to formal consent submissions being made to the relevant LHA.

Unless agreed by the *Project Manager*, no TMS shall be submitted by the *Contractor* for consideration by the Traffic Liaison Group without the prior acceptance of the *Project Manager*.

Unless accepted by the *Project Manager*, no TMS shall be submitted by the *Contractor* for formal approval under the relevant schedules of the Crossrail Act 2008 until it has been considered by the Traffic Liaison Group.

The frequency of the Traffic Liaison Group meetings shall be monthly or otherwise as arranged by the *Employer*.

18.7.1A Details of Events that could have a bearing on the works

The *Contractor* shall establish, through the relevant LHA and the police, details of any events which could significantly affect traffic flows in the vicinity of the Site and the Working Areas.

In the case of work by Others adjacent to the Site or the Working Areas, the *Contractor* shall undertake all necessary liaison to ensure that its TMS is compatible with those adjoining, and that suitable demarcation lines are agreed for signage.

It shall be the *Contractor's* responsibility to ensure he is aware of all other Highway Works that may affect its TMSs. The *Contractor* shall undertake all necessary liaison to ensure that its TMS is compatible with other Project works or works by Others, so that the traffic capacity of any works related diversion routes are not adversely affected by such other works.

The *Contractor* shall, after acceptance by the *Project Manager*, provide an updated Highways Works schedule to the relevant LHA at quarterly NRSWA Coordination meetings.

18.7.2 Not Used

18.8 Traffic Management

18.8.1 General Traffic Management Requirements

The *Contractor* shall identify all traffic management requirements connected with the *works*.

The *Contractor* shall identify, scope and undertake any surveys, inspections, investigations, or testing necessary to assure its TMSs and produce appropriate traffic modelling necessary to support the TMSs.

The *Contractor* shall develop TMSs for the *works* and ensure that any such TMSs are fully co-ordinated with any other schemes in operation by Others.

The *Contractor* shall ensure the design and implementation of each TMS is optimised to meet the requirements of this Works Information in the most efficient and economical manner taking safety, total cost, efficient construction and traffic management into account.

Where traffic signal modifications have been identified or where TMAN notifications are deemed necessary the TMS shall meet TfL ST requirements. TfL-DTO currently advise 32 weeks from payment to signal “switch on” for all signal works in London. All physical works to Traffic signals can only be undertaken by TfL.

The *Contractor* shall produce any detailed traffic management design drawings, plans, modelling, transport assessment or other information required.

The *Contractor* shall minimise the duration of temporary closures of highways and public rights of way and maintain pedestrian access to premises.

The *Contractor* shall produce documentation showing traffic management layout, using drawings to a scale of not less than 1/2500, supplemented by drawings at 1:1250, 1:200 or 1:500 scales as necessary. Drawings shall be produced electronically using CAD or GIS based software. The TMS documentation shall include:

- existing and proposed highway/traffic management layouts;
- designation of highways;
- timing of operations;
- extent of working areas and safety zones;
- removal of street furniture, road markings etc;
- surface levels /contours;
- road markings and surface treatments;
- worksite access/egress points;
- pedestrian routes;

- requirement for tactile paving;
- requirement for dropped kerbs;
- vehicle swept path analyses (for appropriate vehicle types);
- confirmation that sight lines (e.g., from worksite accesses) satisfy local highway authority requirements;
- position of traffic signals;
- position of traffic signs;
- other street furniture;
- number and widths of lanes;
- road drainage details affected by working areas or safety zones;
- extent of lane closures;
- traffic and bus diversion routes;
- relocation of bus stops and stands;
- signing and coning or barrier details for the lane closures required to set up and take down the system;
- the times when these lane closures will be set up and removed;
- crossovers, including construction details and geometric details;
- location of the *Contractor's* store for all Traffic Management Equipment required for the particular TMO;
- road and Site lighting;
- any restrictions arising from the use of substances hazardous to health;
- traffic signal ducts and drawpits, based upon TfL ST-signal section requirements;
- construction details and specification; and
- setting out information and schedules.

The *Contractor* shall provide in this documentation details of the impact of the proposed TMSs and proposed mitigation measures to include but not limited to impacts on capacity/traffic, buses/taxis/interchanges, pedestrians, vulnerable road users, cyclists, accessibility, road safety, HGVs, servicing, parking, wider area impacts, environment and streetscape, and interaction with works by Others.

The *Contractor* shall identify any requirement for the temporary diversion of bus routes or for the temporary relocation of bus stops or stands, and liaise with the LHA and TfL Buses as necessary in order to obtain approvals for such changes.

The *Contractor* shall submit its TMS documentation to the *Project Manager* for acceptance not less than 14 days prior to submission of proposals to the Traffic Liaison Group.

Following concurrence by the Traffic Liaison Group, the *Contractor* shall submit his consent submission to the *Project Manager*. If the *Contractor* wishes to vary any agreed arrangements (including any existing TMS), proposals shall be submitted to the *Project Manager* for acceptance not less than 14 days prior to any discussions with the planning authorities or LHA.

The *Contractor* shall not commence any part of the *works* requiring a TMS until the relevant TMS has been implemented.

The *Contractor* shall undertake appropriate regular inspections of its TMSs.

During the removal of the TMS, any changes to the permanent markings or road studs required for the TMS shall be removed and the *Contractor* shall reinstate the original markings and studs, all to the satisfaction of the *Project Manager* and the LHA. All reinstated road markings shall comply with the Traffic Signs Regulations and General Direction 2002, prior to opening that part of the carriageway to public use.

18.8.2 Temporary Diversions

The *Contractor* shall make provision for maintaining any existing access for any PRM and, where such facilities already exist, appropriate measures shall be implemented to ensure that suitable diversions, temporary footpaths or walkway accesses for any PRM are available.

The *Contractor* shall ensure that temporary footpaths or walkway accesses shall be lit. Where the Site or Working Areas boundary fencing causes a major obstruction of the footway or a footpath the *Contractor* shall provide a purpose constructed diversion or indicate an alternative route.

Whenever a part of the *works* interferes with existing highways or private accesses, the *Contractor* shall ensure that alternatives are provided of a similar standard. Where a temporary complete closure is unavoidable, with no alternative being provided or available, this closure shall be for as short a time as practicable. The *Contractor* shall ensure provision and maintenance of suitable and sufficient signs and barriers, for traffic and pedestrians, during the period of the relevant part of the *works*.

18.8.3 Constraints on Installation and Removal of Traffic Management

18.8.4 Not Used

18.8.5 Access for People with Reduced Mobility Not Used.

18.8.6 Road Safety Audit

A road safety audit of the proposed TMS may be required to meet the requirements of the relevant LHA. The *Contractor* shall be responsible for ascertaining whether an audit is required, for preparing the brief for audit, conducting the audit using an independent auditor and for acting upon all audit recommendations to the satisfaction of the LHA. The *Contractor* shall submit details of the proposed auditors

to the *Project Manager* for acceptance and shall seek the concurrence of the LHA prior to any audit being undertaken.

18.9 Design Requirements

18.9.1 Not Used

18.9.2 Signing

18.9.2.1 Constraints

The *Contractor* shall install traffic signs which have been manufactured in accordance with the appropriate part of BS 873 'Road traffic signs and internally illuminated bollards'. 'Diamond Grade 3990' material will be specified for all signs. Only prescribed traffic signs or variants of traffic signs contained in the Traffic Signs Regulations and General Directions 2002 shall be used. Appendix A of Local Transport Note 1/94 'The Design and Use of Directional Informatory Signs' gives details of the x-height and siting distance requirements.

18.9.2.2 Commencement Date Signing

The *Contractor* shall be responsible for the erection of Advance Warning Signs (for example advance notification of the start of the work affecting the highway), including the use of the *Employer's* standard information board design (which shall contain the Crossrail Public Helpdesk number). The *Contractor* shall propose sites where advance warning signs are to be erected for the *Project Manager* and the LHA's acceptance, as part of the preparation of any TMSs. The *Contractor* shall provide and erect at agreed locations, Signs 7003 as identified in the Traffic Signs Regulations and General Directions 2002, giving details of the start date and duration of the work affecting the highway. The *Contractor* shall erect the signs at least 12 days before the start date for the TMS and shall ensure signs are maintained in a clean and legible condition until removal. The *Contractor* shall remove these signs upon commencement of the work affecting the highway.

18.9.2.3 Not Used

18.9.2.4 Non-prescribed Signs

If it is necessary to use signs which are not prescribed by the Traffic Signs Regulations and General Directions 2002, the *Contractor* shall note that the normal time required for processing approval of non-prescribed signs 16 weeks from submission to the *Project Manager* for acceptance

18.9.3 Not Used

18.9.4 Not Used

18.9.5 Lane Closures

The *Contractor* shall carry out any lane closures in accordance with the design requirements of Chapter 8 Design of the Traffic Signs Manual. In Sections D3.3, D5.4 and D6.3 of Chapter 8 Design, where reference is made to desirable minimum, this shall be considered to be absolute minimum.

18.9.6 Not Used

18.10 Lorry Management

18.10.1 Not Used

18.10.2 Not Used

18.10.3 Routing of Vehicles – General

Anything which is to be transported by the *Contractor* on a highway by a Large Goods Vehicle to the Site or Working Areas, will be constrained to means and routes as prescribed by the *Employer*, following approval by the appropriate planning authority.

The *Contractor* shall ensure that only the Schedule 7 approved routes and the MRN are used by lorries accessing and egressing the Site or the Working Areas.

The *Contractor* shall ensure that once a vehicle is on any part of the Schedule 7 approved route it does not deviate from that route until it reaches either the Site or the Working Areas or exits from the MRN.

The contractor shall use the safest, most practicable route for Large Goods Vehicles when accessing the MRN or the Schedule 7 approved routes.

18.10.4 Signing to Construction Sites

Direction signing from the TLRN to and from the Site or Working Areas and to lorry holding areas will be undertaken by the *Employer*.

The *Contractor* will provide at least 28 days notice to the *Project Manager* of the operational dates (i.e., opening and closing dates) for all accesses to the Site and the Working Areas to allow signage to be installed or removed as required. The *Contractor* will also provide at least 28 days notice to the *Project Manager* of any relocation of Site or Working Area access points.

The site numbering system will be as shown in Appendix 18A.

18.11 Not Used

18.12 Olympic Route Network and Paralympic Route Network

The *Contractor* is responsible for liaison and planning to mitigate the impact of the staging of the Olympic Games and Paralympic Games on his work including but not limited to the potential impacts of congestion on lorry routes that either are on the ORN/PRN or that are potentially affected by displaced traffic from the ORN/ PRN whilst it is in operation.

18.13 Traffic Signals

18.13.1 Not Used

18.13.2 Portable Traffic Signals

The *Contractor* shall, except where otherwise required by the *Project Manager* allow a minimum of 6 weeks for processing approval of temporary traffic signals.

18.14 Construction and Maintenance

18.14.1 Satisfactory Completion of works affecting the Highway

Where temporary alterations to the highway are required, the *Contractor* shall restore the highway to the satisfaction of the LHA.

Where the *Contractor*:

Diverts a highway; or

alters a highway, otherwise than by carrying out street works within the meaning of Part 3 of the New Roads and Street Works Act 1991,

Then it shall ensure that:

- the construction or alteration shall be completed to the reasonable satisfaction of the LHA; and
- unless otherwise agreed between the *Project Manager* and the LHA, the new or altered highway shall be maintained by and at the expense of the *Contractor* for a period of 12 months from the later of:
 - the date of Completion of the new highway; and
 - the date on which it is first open for public use;
 - After the end of that period it shall be maintained by and at the expense of the LHA.

18.15 Operational Requirements

18.15.1 Condition Surveys

The *Contractor* shall carry out surveys, in consultation with the highway authority, to establish the condition of the highway prior to the commencement, and after the completion, of the any works affecting the Highway. The *Contractor* shall notify the LHA in advance of surveys taking place.

18.15.2 Not Used

18.15.3 Temporary Lighting

Temporary lighting for works affecting the Highway shall be provided and maintained by the *Contractor* during the hours of darkness and at times of poor visibility to illuminate all working spaces wherever the works affecting the Highway are in progress.

18.15.4 Street Furniture

The *Contractor* shall protect and/or stored any street furniture identified as such in the Works Information and then reinstated prior to re-opening roads, footways or footpaths as a result of implementing TMSs.

18.15.5 Road Cleanliness

The *Contractor* shall implement measures to avoid, limit and mitigate the deposition of mud and other debris on the Highway including:

- hardstanding at the access and egress points which will be cleaned regularly;
- vehicle wash down points to clean vehicle wheels at each exit point on to the Highway;
- the correct loading of vehicles and sheeting of loads to avoid spillage during their journeys;
- the use of mechanical road sweepers combined with water sprays for the suppression of dust to clean site hardstandings, roads and footpaths in the vicinity of the site; and
- the flushing of gullies in the vicinity of the Site.

After completion of any *works* affecting the Highway, the *Contractor* shall clear all surplus materials arising from the any works affecting the Highway from the highway. The *Contractor* shall leave it in a clean and tidy condition in accordance with the reasonable requirements of the LHA.

18.15.6 Not Used

18.15.7 Not Used

18.15.8 Not Used

18.15.9 Not Used

18.15.10 Not Used

18.16 Not Used

18.17 Reporting and Review

The *Contractor* shall submit a progress report as part of the periodic reporting requirements. The report should include the following:

- highways and traffic incidents, including defect notices received from consent granting authorities, corrective and preventive actions;
- submission of highways consent applications to consent-granting bodies and granting or refusal of consent by the consent-granting bodies;
- key highways and traffic issues raised by Others;
- highways and traffic complaints;
- progress against programmes.

18.18 Appendices

Appendix 18A	Worksite Numbering Scheme
Appendix 18B	Consents Proforma – Form 2a
Appendix 18C	Consents Proforma – Form 3a
Appendix 18D	Consents Proforma – Form 3b
Appendix 18E	Consents Proforma – Form 3c
Appendix 18F	Consents Proforma – Form 3d
Appendix 18G	Consents Proforma – Form 3e
Appendix 18H	Consents Proforma – Form 3f

Part 19 – Health and Safety Management

19.1 Commitment Statement

The *Employer* aspires to build the Project in a way that achieves zero accidents and incidents. The "Health Safety and Environment Standard: Contractors and Industry Partners" (the H&S Standard) sets out how this is to be achieved. The health and safety requirements set out in the Works Information translate the requirements of the H&S Standard into contractual responsibilities and obligations.

A copy of the H&S Standard can be downloaded from www.crossrail.co.uk. The H&S Standard will be updated throughout the life of a contract, and the most up to date document will always be available on the website.

19.2 Introduction

This part of the Works Information describes the health and safety requirements that shall apply to this contract. The *Contractor* shall provide the Works in accordance with these health and safety requirements.

19.2.1 The *Employer's* Health, Safety and Environment Policy Statement

The *Employer* is responsible for delivering the Project in accordance with Transport for London's Health Safety and Environment Policy. The *Employer's* Health Safety and Environment Policy Statement sets the leadership framework for the delivery of the Project in line with this policy and the additional objectives set by the *Employer*.

A copy of Transport for London's Health Safety and Environment Policy and the *Employer's* Health Safety and Environment Policy Statement can be found within Appendix 19A.

The *Contractor* shall comply with the spirit and intent of the *Employer's* Health Safety and Environment Policy Statement. In particular, the *Contractor* shall :

- demonstrate a high level of commitment to health and safety by active engagement with the *Employer's* "Target Zero: A State of Mind" philosophy, principles and programme;
- demonstrate exemplary standards of health and safety performance and management whether in design, construction or testing and commissioning;
- ensure method statements/work package plans and risk assessment processes are in place to identify hazards and to implement mitigation measures to reduce risk for all parties affected to an acceptable level and as low as reasonably practicable (ALARP);

- ensure a high level of commitment to health and safety from senior managers, managers, supervisors, employees and subcontractors and suppliers of any tier;
- ensure continuous improvement in safety performance, in accordance with the principles within the Health and Safety Executive publication entitled “Successful Health and Safety Management” (reference HSG65) and have in place a project specific health and safety improvement plan;
- set high standards of health and safety performance and behaviour;
- ensure that persons for whom they are responsible are aware and accurately informed of their own health and safety responsibilities and accountabilities;
- challenge poor health and safety performance and personally take action when they see a breach of rules or unsafe working practices, however small;
- ensure that a purposeful communication system is established between themselves and their workforce and senior managers to visit and inspect workplaces personally on a regular basis;
- ensure that contractors support and comply with any health and safety plans, audits, visits or inspections by bona fide representatives of the Programme;
- gather, analyse and share health and safety information and data to the benefit of all involved;
- take part in and personally contribute to health and safety events, meetings and campaigns, including the *Employer’s* people-based behavioural safety programmes in support of the *Employer’s* “Target Zero: A State of Mind” philosophy, principles and programme. It is expected that directors and managers shall contribute to inspections, incident reviews, health and safety forums and, undertake at an accepted frequency, Leadership Tours to a level consistent with the *Employer’s* process; and
- participate in the *Employer’s* gateway and health and safety self assurance schemes.

19.2.2 Health, Safety and Environment Agreement

To formalise the respective, health, safety and environmental contribution of all Project participants, the Crossrail Health Safety and Environment Agreement (the H&S Agreement) is set in Appendix 19B identifying a number of key health, safety and environmental leadership behaviours and values that underpin the *Employer’s* determination to deliver health, safety and environmental excellence across the Project.

At the *starting date* the *Contractor* shall sign the H&S Agreement and ensure that a monitoring regime is implemented that ensures that the behaviours and values included in the H&S Agreement become embedded in the *Contractor’s*

organisational culture. The *Contractor* shall provide the *Project Manager* with a signed copy of the H&S Agreement and will display copies of this H&S Agreement at the Site and in the Working Areas.

19.3 Organising for Health and Safety

19.3.1 The *Employer's* and *Project Manager's* Commitments

The *Employer* and *Project Manager* are committed to delivering exemplary levels of health and safety performance. Where examples of health and safety excellence are identified within the activity of any of the involved parties, these will be communicated widely so that benefit may be derived across the Project.

The *Employer* and *Project Manager* take very seriously the commitment to avoiding injuries and learning from any near miss events to improve health and safety performance, as reflected in the setting of explicit accident and ill health management aims via the *Employer's* "Target Zero: A State of Mind" philosophy, principles and programme.

The *Contractor* shall respond promptly if the *Project Manager* requests a meeting with a senior representative from the *Contractor* (typically a director identified as responsible for the work) to discuss any notifiable or reportable event, adverse trends or other evidence of a serious non-compliance with the legislation or health and safety requirements stated in this part of the Works Information.

Similarly, the *Project Manager* commits to meet with any director from the Project supply chain where they have health or safety matters that they wish to raise. This can be either via the Crossrail Directors' Health and Safety Forum or on a one to one basis.

19.3.2 "Target Zero: A State of Mind"

"The *Contractor* shall implement a programme that meets the *Employer's* "Target Zero: A State of Mind" philosophy and principles..

19.3.2.1 The Principles of Target Zero

The Target Zero programme declares through three simple principles that excellent performance in health, safety and environment is something that is not only achievable, but is something that is expected; being safe at work at all times is a fundamental right of all workers and managers alike.

The key to achieving this is in practically applying the following three basic principles and to ensure that they occupy a prominent position in the minds of everyone involved as decisions and choices are made and tasks are carried out. The challenge to be overcome is in replacing the traditional state of mind that says construction is dangerous and history tells us that people get hurt, with a new state of mind where everyone truly believes:

- We all have the right to go home unharmed at the end of every day.

- All harm is preventable.
- We must all work together to achieve this.

A strong health and safety culture is recognised as fundamental to achieving excellent performance and requires action by all involved. Visible health and safety leadership is fundamental in the creation of a strong health and safety culture and the successful delivery of the Target Zero programme on the Project.

The *Contractor* shall implement appropriate measures including the application of user-friendly management systems, near miss reporting, and shall make use of safety climate tools and other employee satisfaction measures such as behavioural safety, benchmarking, key performance indicators, communications, recognition and other mechanisms to create, embed and sustain an effective health and safety culture.

The *Employer* believes that it is the integration of both objective and subjective factors that affect people’s behaviour and determine overall health and safety performance. This integrated approach is illustrated in Fig 19.3 below. In practical terms it includes the design and implementation of effective management systems that enable staff at all levels to work without harm, the values and priorities of leaders who help to determine the culture of a programme or site, and the personal experiences and beliefs of individuals. The Target Zero programme and associated principles are based on this integrated model.

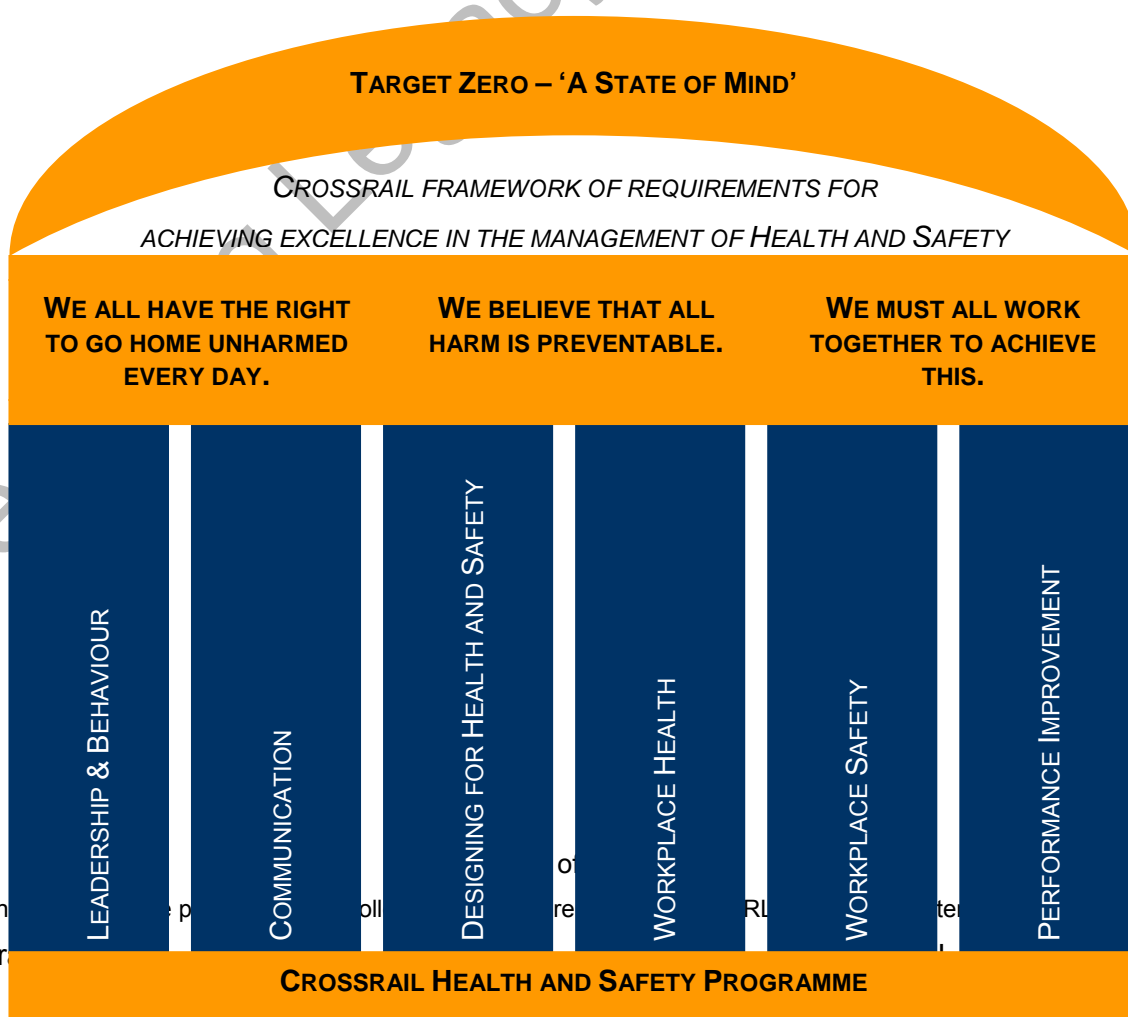


Figure 19.3 – Integrated Target Zero Model

19.3.2.2 Target Zero Leadership

The *Contractor* shall ensure that all personnel for whom it is responsible either as employer or duty holder and as part of its Principal Contractor duties are aware of their responsibility for ensuring they follow the principles of the Target Zero programme in all their work activities. Applying these principles to any programme that they own or adopt and which is suited to their own business, the *Contractor* and subcontractors and suppliers of any tier shall focus on ensuring that when delivering, managing and executing their role on the project they:

- align expectations against the *Employer's* Target Zero vision and objectives;
- demonstrate leadership commitment and provide training that will allow employees in positions of leadership to positively reinforce safe behaviours that prevent injuries, and to coach / discuss at-risk behaviours that can contribute to injuries or incidents;
- commit resources to fully support their health and safety duties and the Target Zero programme;
- embed effective communication systems;
- apply appropriate behavioural tools and techniques;
- establish reward and recognition systems;
- identify employee competency requirements and have training programmes in place to ensure employees are competent to understand the risk controls and behaviours expected to undertake the *works*;
- develop and apply key performance indicators (KPI's); and
- monitor effectiveness of systems and programmes.

The *Contractor* shall ensure that its leadership teams are familiar with the content of the Health and Safety Commission/Institute of Directors publication entitled "Leading Health and Safety at Work" which sets out an agenda for the effective leadership of health and safety. Its essential principles are:

- Strong and active leadership from the top:
- Visible, active commitment
- Establishing effective downward communication systems and management structures
- Integration of good health and safety management with business decisions

- Worker involvement:
- Engaging the workforce in the promotion and achievement of safe and healthy conditions
- Effective upward communication
- Providing high quality training
- Assessment and review
- Identifying and managing health and safety risks
- Accessing and following competent advice
- Monitoring, reporting and reviewing performance

19.3.2.3 Role of managers and supervisors

The *Contractor's* managers and supervisors shall be expected to demonstrate the following leadership behaviours:

- pro-actively co-ordinate, co-operate and interface with internal and external parties associated with the project;
- set high standards of health and safety performance and behaviour;
- take part in, and personally contribute to health and safety events, meetings and campaigns, and promote and implement the Target Zero programme;
- ensure that persons for whom they are responsible are aware and accurately informed about the risk and hazard associated with their tasks and of their own health and safety responsibilities and accountabilities;
- challenge poor health and safety performance and personally take action when they see a breach of rules or unsafe working practices, however small;
- reinforce to all direct reports and others their right to stop work that may expose employees and others to harm;
- maintain awareness of the *Employer's* health and safety policies, rules, standards and performance targets that affect their activities;
- ensure that a purposeful communication system is established between themselves and their workforce;
- ensure compliance with, and support of health and safety plans, audits, visits or inspections by the *Project Manager* and/or *Employer*;

- participate and actively engage in the *Employer's* steering groups forums provided as a platform to improve HSE co-ordination and co-operation;
- participate in behavioural perception and culture surveys as required or specified by the *Project Manager*;
- participate in organised site tours, leadership walk-downs as required or specified by the *Project Manager*;
- engage and require high standards of health and safety behaviours from the supply chain; and
- actively encourage feedback from the workforce and take appropriate actions and where necessary reinforcing the stop work process.

19.3.3 Crossrail Golden Rules

In support of the Target Zero programme, the *Employer* and *Project Manager* have developed Crossrail Golden Rules that are to apply to everyone involved in the Project.

The Crossrail Golden Rules focus on those activities that are known to represent particular safety risks at sites and are designed to mandate behaviours that will protect all workers from serious harm.

The *Contractor* shall ensure that all people engaged on the *works* understand and comply with the Crossrail Golden Rules to support the purpose of creating a safe working environment.

The Crossrail Golden Rules are detailed in Appendix C and cover the following seven topics:

- All projects (conveying general requirements that apply to all work).
- Plant Operation, Vehicles & Driving;
- Lifting (all lifting equipment and cranes);
- Working at Height (excluding the use of ladders for access);
- Breaking Ground;
- Confined Spaces; and
- Energy/ Electrical Isolation

The *Employer* will provide copies of the Crossrail Golden Rules in poster form and other formats. The *Contractor* shall display copies of the Crossrail Golden Rules in poster form in prominent locations around the Site and use other formats for communication of the Crossrail Golden Rules to all people engaged on the *works*.

The *Contractor* shall ensure that the Crossrail Golden Rules form a key part of the induction process and the ongoing training of all people engaged on the *works*. The *Contractor's* managers and supervisors shall routinely check the workforce's knowledge of the Crossrail Golden Rules and reinforce through their own actions and behaviour.

The Crossrail Golden Rules shall be applied firmly and fairly and the *Contractor* shall ensure that breaking the Crossrail Golden Rules is a disciplinary issue that the *Contractor* shall manage in accordance with the consequence management protocols described in 19.3.7 below.

19.3.4 Target Zero and Behavioural Safety

19.3.4.1 General

The *Contractor* shall actively co-operate with the *Employer* and the *Project Manager* in enabling people to make safe choices regarding their behaviour at work. This can be achieved by a range of measures.

The *Contractor* shall cooperate and participate and shall procure subcontractors and suppliers of any tier that shall cooperate and participate in the *Employer's* Target Zero programme.

19.3.4.2 Behaviour Based Safety Programme

As a key part of this approach, the *Contractor* shall implement a behavioural based safety programme to address the human behaviour element of risk management and be able to provide feedback on behaviour trends and causes such that lessons may be shared and learned.

The *Employer* will run a Safety Alert process whereby lessons learned from behaviour observations, unsafe condition reports and/or incidents across the Project are reported and shared. The *Contractor* shall cooperate, support and participate in this process both as initiators of Safety Alerts and in the cascade of any Safety Alerts advised by the *Employer* and/or *Project Manager*.

19.3.5 Pre-Task Health and Safety Briefing

19.3.5.1 Pre-Task Health and Safety Briefing Process

The *Contractor* shall actively participate and engage in short specific health, safety and environmental briefings prior to the start of work activities. Use of this safety improvement process or similar shall be implemented on all sites in which the *Contractor* is the Principal Contractor.

The *Contractor* shall discuss the risks associated with the task and work area and compile necessary information to brief to the employees. The *Contractor* shall:

- ensure all employees are trained in the briefing process;

- establish a safe system follow-up with all employees to verify the briefing process is being implemented effectively;
- on completion of the briefing content discuss the content with employees; and
- display the briefing information in close proximity to the working areas.

19.3.5.2 Re-Briefing Process

Where an unsafe act or condition has been identified which involves stopping work, the Pre-Task Health and Safety Briefing requirements shall be re-assessed before work commences. The requirements for performing a re-briefing session are as follows:

- observe unsafe work in practice;
- stop work and send employees to a re-briefing session;
- advise the work's supervisor of the re-briefing action and where possible request their attendance at the session;
- determine the reason the unsafe work occurred;
- all employees involved agree to the safe work plan;
- employees sign the re-briefing documentation; and
- employees are allowed to return back to work.

These signed briefing sheets shall be retained by the *Contractor* at the location of the activity and made available to the *Project Manager* upon request.

19.3.6 Target Zero Communication, Engagement and Training

As part of the overall Target Zero programme, the *Contractor* shall introduce initiatives to reinforce the programme to stimulate education, engagement of the workforce and evolution of processes and procedures to provide a proactive approach to learning from experience and continuously striving to meet the principles of Target Zero.

Examples of these initiatives are listed below:

- contractors HSE Forums;
- mobile safety bus;
- people based safety;
- incentive schemes;

- safety alerts and bulletins;
- HSE stand downs;
- broken lives programme;
- *Employer* led Target Zero programmes;
- poster campaign; and
- interactive media tools.

19.3.7 Target Zero and Consequence Management

The consequence management arrangements that the *Contractor* shall follow for breach of all rules (including the Crossrail Golden Rules) are as outlined in this part of the Works Information.

The *Contractor* shall have in place procedures to drive positive behaviours; where disregard for safety will potentially expose site personnel and visitors to danger. Procedures shall include a 'stop work' process that reinforces this approach providing site personnel with an opportunity to engage management and resolve unsafe activities at source. The *Contractor* shall maintain effectiveness of the safety programme, enable continuous improvement, and maintain records.

19.3.8 Target Zero and Recognition and Reward

The *Contractor* shall develop a health and safety recognition and reward programme designed to incentivise personnel and construction and management teams at all levels to make a positive contribution to excellent health and safety performance such as near miss reporting and safety observations.

The *Contractor* shall submit his proposals for a recognition and reward programme to the *Project Manager* for acceptance. The *Contractor* shall implement the accepted recognition and reward programme.

The *Contractor* shall fully support the *Employer's* health and safety incentive programmes, and actively engage in joint inspections, and reviews by the *Project Manager* and/or the *Employer*.

19.3.9 Work Safe Arrangements

19.3.9.1 Responsibilities

The *Contractor* shall ensure that all employees and subcontractors and suppliers of any tier are made aware of their responsibility for their own safety and the safety of others and for ensuring that the activities they undertake are safe and do not place others at risk. The *Contractor* shall ensure that employees do not enter any areas where they are putting themselves or others at risk in doing so.

The *Contractor* is reminded that no employee is expected to undertake a task where they have concerns for their own safety and safety of others. The *Contractor* shall ensure that any health or safety concerns raised by employees and the associated actions taken shall be recorded to allow for appropriate trend analysis and remedial action to be undertaken.

The *Contractor* shall ensure that work safe arrangements for complaints or concerns are addressed in a timely manner. Arrangements shall be put in place to advise all employees and subcontractors and suppliers of any tier and visitors before entering any worksite through orientation, pre-start briefings, work method statements, risk assessments and other communication forums reinforcing open communication for work safe issues and complaints and concerns.

19.3.9.2 Review of Worker Concern

The *Contractor* shall comply with the following guidance for a concern or a refusal to work issue raised by an employee (this guidance is also set out in the H&S Standard):

- it is the responsibility of the employee's supervisor or manager to include additional persons in the refusal to work review, where they bring required areas of expertise;
- if the employee is still not happy with the environment or task being carried out and agreement cannot be reached, they have the right to continue to refuse to work and the concern shall be raised as an incident. The task can then only be continued once a thorough risk based review has been undertaken of the task and environment;
- the employee is made aware of the various choices they have for raising concerns with other parties (e.g. local Health and Safety Representative, the *Employer's* and/or the *Project Manager's* health and safety team); and
- where an agreement has been made and the task continued, this shall be advised to the *Project Manager* for noting along with the associated mitigation action taken.

19.3.9.3 Review of Visitor Concern

The *Contractor* shall comply with the following guidance for a concern raised by a site visitor (this guidance is also set out in the H&S Standard):

- it is the responsibility of the supervisor or manager responsible for the visitor to include additional persons in the review where they bring required areas of expertise;
- it is essential that visitors are in a position of safety before any discussions on the concern takes place;

- if the visitor is a member of an enforcing authority then the visitors guide must ensure that the *Contractor's* senior manager and the *Project Manager* are notified immediately; and
- where an agreement has been made and the task continued, the *Contractor's* senior manager shall decide on the level of reporting for the concern. As a minimum, the concern raised and the mitigating action taken recorded to allow for trend analysis.

19.3.10 Regulatory Liaison

The *Contractor* shall provide free and unhindered access to any regulatory enforcement staff and other parties such as representatives of insurers. The *Contractor* shall ensure that the *Project Manager* is contacted and advised immediately of pre-arranged and unannounced site visits and of all actions by regulators in connection with the *works*, including:

- site visits and comments made during such visits;
- site inspections and comments made during such inspections;
- written communication; and
- enforcement notices or other formal action.

The following regulators are seen as key and influential stakeholders in relation to health and safety matters:

- Health & Safety Executive;
- Local Authority Environmental Health Officers;
- London Fire and Emergency Planning Authority;
- Office of Rail Regulation; and
- Port of London Authority.

The *Employer's* Health and Safety Director takes primary responsibility for maintaining good communications between the Project and the above parties on health and safety matters.

The Project via the *Employer's* Health and Safety Directorate shall maintain regular and routine contact with all regulators on health and safety matters, primarily through regular communications, formal reports and meetings.

19.4 Occupational Health

19.4.1 General

The *Employer* believes an occupational health programme delivered through the effective implementation of the occupational health standards, as essential in the delivery of the overall business objectives.

Good health will have a positive effect on employees and the delivery of the Project.

As well as providing clinical services such as health checks, occupational health services aim to be proactive in their management of employee health.

The *Employer* recognises key areas in occupational health which an effective programme will help to achieve:

- Promotion and maintenance of the highest degree of wellbeing of workers
- Ensuring that workplaces are designed in order to prevent workers health being affected by working conditions. Thus reducing the impact of work on health;
- The protection of workers in their employment from risks resulting from factors adverse to health
- Reduction absence due to work related illness
- Eliminate preventable ill health and
- Rehabilitate workers

Constructing Better Health

The *Employer* has adopted the Constructing Better Health (CBH) Industry Standards for Workplace Health in UK Construction as part of the Crossrail occupational health checks programme. Further information can be found on the Constructing Better Health website: www.constructingbetterhealth.co.uk.

Contractor CBH Responsibilities

The *Contractor* shall become a member of the CBH scheme and ensure that all employers within the *Contractor's* supply chain (contractors and suppliers of any tier undertaking construction work on this contract) also become registered members of Constructing Better Health and the Constructing Better Health standards are implemented by them;

The *Contractor* shall ensure that any individual working within the Site and/or the Working Areas are registered with CBH and issued with a CBH unique reference number and card unless they are an existing holder of a CBH card or an affiliated card.

The *Contractor* shall ensure that CBH Standards for health checks include; health surveillance, fitness work assessment of safety critical and non safety critical personnel are implemented on this contract, and the outcomes from the assessment are recorded in the CBH database.

The *Contractor* shall ensure that line managers and supervisors are given sufficient instruction and training to allow them to identify risks to employee health, with assistance from their health and safety team or professional occupational health advisor, where necessary.

19.4.2 Occupational Health Services Providers

The *Contractor* shall ensure that their Occupational Health Service Providers and those of their supply chain are members of CBH and have attained the standard of practice 'Safe Effective Quality Occupational Health Service' (SEQOHS) which has been accredited by the Faculty of Occupational Medicine by December 2013.

The *Contractor* shall ensure that their Occupational Health Service Providers and those of their supply chain provide advice and guidance on achieving compliance with this part of the Works Information as well as:

- providing advice on occupational health issues as they arise;
- development of strategies to reduce exposure to health risks and in response to
- potential emergency situations;
- providing guidance on monitoring performance; and
- promotion of health and fitness.

The *Contractor* shall ensure that:

- occupational health risk assessments are completed by a suitably competent person;
- an occupational health provider is engaged to provide full occupational health services and that additional first aid and emergency provisions which may be provided by a site nurse are made available at all facilities/sites;

The *Employer* has engaged with and prepared a list of Occupational Health Service Providers who have undergone an audit process in regard to occupational health capability. The list of Occupational Health Service Providers can be found on the *Employer's* website within the Occupational Health section of the Health, Safety and Security area. These organisations have demonstrated the capability to provide the full range (proactive and reactive) and/or solely preventative occupational health services. The *Contractor* (including the employees of site based subcontractors and suppliers of any tier except lorry drivers whose health requirements are included within LGV driving licence requirements and therefore outside the scope of CBH): may select any SEQOHS and CBH accredited Occupational Health Service Provider

to provide the mandatory occupational health, drug and alcohol, first aid, treatment and emergency response services in the sections below.

19.4.2.1 Occupational Health Services (Mandatory Requirement)

The *Contractor* using the occupational health expertise required within the Works Information:

- provides health questionnaires for completion by individuals who are not safety critical on commencement for construction personnel and where appropriate for office based staff in accordance with CBH Standards, unless the individual can demonstrate they have a current assessment recorded in the CBH database;
- provides construction Safety Critical Worker fitness for task assessments in accordance with the industry (CBH) standards to all construction safety critical workers unless the individuals can demonstrate they have a current assessment recorded in the CBH database;
- provides railway Safety Critical Worker health assessments in accordance with the London Underground and Network Rail standards where appropriate for all railway safety critical workers unless they can demonstrate they have a current assessment recorded in the CBH database;
- provides specific health assessments for those referred following evaluation of questionnaires and maintaining a record of these assessments in accordance with CBH Standards;
- provides specific health surveillance defined by risk assessment for those requiring such surveillance under applicable health and safety legislation;
- provides occupational hygiene services to support and assess ill health prevention management;
- provides the opportunity for health checks for operatives, including general health, personal guidance, health promotion, etc. and to include relevant factors for safety critical workers
- provides lifestyle checks including general health, personal guidance, health promotion, etc.;
- contributes to the effectiveness of attendance management, rehabilitation and return-to-work programmes;
- supports ill health incidence investigation where necessary; and provides health promotion programmes applicable to construction operatives' workplace and lifestyle
- makes physiotherapy services available to treat musculoskeletal problems arising at work or outside work, but impacting on work; and

- provides physiotherapy services to liaise with other clinical professionals to ensure effective case management.

19.4.2.2 First Aid, Treatment and Emergency Response Services (Mandatory Requirement)

- providing first aid and emergency response services to be operated from site based facilities appropriate to each work location;
- providing a treatment service for those likely to have difficulty accessing medical care locally;

19.4.2.3 Drug and Alcohol services (Mandatory Requirement)

- testing for drugs and alcohol in accordance with the requirements of the Works information

19.4.2.4 Other Occupational health services to be provided

In addition to the above Occupational Health services detailed, the *Contractor* shall ensure that the additional occupational health services detailed below are provided by the Contractor's Occupational Health Service Provider:

- provision of advice and guidance on occupational health to the *Contractor*
- contributing to the development and continuous improvement of the occupational health and well being strategy through attendance at and cooperation with the CBH meetings and *Employer's/Contractors Health and Safety Managers (Occupational Health) Forums*;
- providing advice to the *Contractor's* supply chain to assist in compliance with the *Employer's* occupational health standards;
- ensuring appropriate clinical governance is in place to incorporate suitable record keeping including the use of the CBH record system; and
- compiling periodic reports detailing activity and achievements.

The *Contractor* is responsible for auditing and reviewing their Occupational Health Service Provider on a regular basis and providing the outcome of these audits to the *Project Manager* upon request

19.4.3 Reducing the Impact of Work on Health

Eliminating and reducing exposure to health risks is a requirement of all organisations working on the Project; in particular the *Contractor* must ensure that:

- design teams have suitable and professional advice available, to enable them to conduct adequate/suitable and sufficient assessment of health risks;

- design teams are briefed/trained on the *Employer's* guidance document Healthy by Design which is available from the Employer's website (<http://www.crossrail.co.uk/delivering/health-safety-security/occupational-health>);
- design teams have systems and controls in place to ensure that occupational health issues are identified, eliminated where possible and/or mitigated where necessary so as not to import additional risk into the Project through materials, equipment or work processes;
- design teams have occupational hygiene advice available to enable suitable and sufficient assessment of health risks;
- design teams share issues across the Project at the designers forum;
- physiotherapy services are available to be involved in ergonomic / design issues as appropriate;
- line managers and supervisors are provided with time and resources to implement guidance given by the Occupational Health Service Providers;
- line managers are encouraged to work with Occupational Health Service Providers when carrying out risk assessments and considering process modifications to ensure that the potential health impacts are considered;
- time and resources are made available to line managers, from Occupational Health Service Providers, to facilitate the reduction of the impact of work on health
- line managers involve Occupational Health Service Providers in the review of accidents, incidents and exposure control;
- systems and controls are in place to ensure that occupational health issues are identified, eliminated where possible and/or mitigated where necessary so as not to import additional risk into the Project through materials, equipment or work processes; and
- processes are in place to audit and review occupational health arrangements.

19.4.4 Reducing the Impact of Health on Work

The *Contractor* must put in place processes to control the impact of work activities on people with existing health conditions. Processes to be introduced include fitness for work assessments and periodic health surveillance - including:

19.4.4.1 Fitness to Work

As a part of the induction process, the *Contractor* shall ensure that construction workers and office staff (where appropriate) shall be assessed using the health assessment matrix contained in the CBH Fitness for Task Standard which is

available on the CBH website (<http://www.cbhscheme.com/Publications>), and be classified as safety critical or non safety critical. These individuals must then be subjected to a health assessment in accordance with the Fitness for Task Standard.

In addition to the above any individuals undertaking railway related safety critical work listed in LU Standard 1-548 Safety Critical Work shall be subject to a health assessment in accordance with the LU standard 1-601 management arrangements to ensure medical fitness.

These assessments must be repeated at the intervals set out in the CBH Standards and LU Standards.

19.4.4.2 Health Surveillance

The *Contractor* shall have a process that identifies those workers who require health assessments. The period and nature of the assessment will be defined by the occupational health provider and CBH Standards. The assessment shall also take into account the nature of and risks associated with the work that is being carried out and any individual circumstances.

The *Contractor* shall ensure that the occupational health provider:

- develops and operates health surveillance programmes;
- provides advice when health surveillance is required having reviewed the risk assessments, hygiene data and CBH standards;
- completes health surveillance within an appropriate timescale;
- informs organisations and individuals, within an acceptable timescale, of the outcome of all health surveillance;
- retains all clinical records for the statutory period and ensure all data protection requirements are met;
- ensures a CBH compliant consent form for holding information on the CBH database is provided to all individuals and explains to them the purpose of the consent
- records details of assessments in the CBH database;
- provides statistical information and trend analysis of the results of health surveillance to an agreed programme; and
- provides advice to the *Contractor* and employees on all matters relating to occupational health and brings to their attention any matters where additional mitigating measures are required within design, procurement or construction and emergency service requirements.

19.4.5 Employee Wellbeing

The *Contractor* shall have in place processes to promote health and well-being. The *Contractor's* accepted Occupational Health Service Provider shall use these activities to raise awareness of work-related and lifestyle health issues.

19.4.5.1 Campaigns and Education

The *Contractor* shall ensure that their Occupational Health Service Providers utilise campaigns and targeted health education to reduce the risk of occupational disease, to raise awareness of health trends and the benefits of a healthy lifestyle. As a minimum this shall include:

- participation with the quarterly health and well being programmes which will run throughout the Project, based on topics agreed at the *Employer's* occupational health forum aiming to involve 100% of the construction workforce; and
- holding monthly construction site based campaigns which tackle site specific health issues based on risk assessment, health surveillance, fitness for work and accident data. These campaigns should target as a minimum 25% of the workforce.

19.4.5.2 Lifestyle screening

The *Contractor* will make available lifestyle screening, where appropriate tied in to health and well being programmes, to all personnel (including subcontractors) working on the contract with the aim of offering appointments to all personnel every two years.

19.4.6 Management and Assessment of Fatigue

The *Contractor* shall develop suitable management arrangements to control working hours and/or shift patterns in order to address and manage the risk of fatigue and submit these proposals to the *Project Manager* for acceptance.

The *Contractor* shall adopt industry best practice arrangements and review and assess these arrangements with the *Project Manager* in accordance with the Working Hours and Shift Pattern Assessment criteria detailed below. These include an assessment of shift patterns, rotation of workers, restrictions on overtime, maximum working hours identified, localised welfare provisions and the extent of mandated weekends off for operatives. Guidance on the management and assessment of fatigue is provided in Health and Safety Executive report reference RR446 entitled "The Development of a Fatigue/Risk Index for Shift workers".

Very Poor

Inadequate system in place to manage fatigue in the tunnelling/ construction scope of work.

Poor	Management of working hours only as part of it's arrangements to manage fatigue within the tunnelling /construction scope of work.
Fair	Shift patterns, overtime restrictions, rotation of workers and support inclusion of travel time as part of it's arrangements to manage fatigue, along with provision of welfare facilities within the tunnelling/construction scope of work.
Good	Shift patterns, restrictions on overtime, maximum working hours identified, localized welfare provisions, utilization of HSE Best practices, mandated weekends off for workers.
Excellent	Shift patterns, rotation of workers, restrictions on overtime, maximum working hours identified, localised welfare provisions, full utilization of the HSE Best practices on fatigue, risk index calculator, mandated weekends off for workers.

The *Contractor* shall ensure that the minimum Fatigue/Risk Index assessment achieved for its working hours and shift pattern proposals is 'Fair'. Where an assessment of 'Fair' is achieved the *Contractor* shall develop an improvement plan to work towards an assessment of 'Good' or 'Excellent'.

Working hours or shift pattern proposals that result in an assessment of 'Poor' or 'Very Poor' shall be unacceptable. Where an assessment of 'Poor' or 'Very Poor' is achieved the *Contractor* shall take immediate measures sufficient to achieve an assessment of 'Fair'.

19.4.7 Construction Site First Aid, Treatment and Emergency Response

The *Contractor*, shall ensure that its emergency response provision includes:

- Treatment room(s) and equipment positioned at appropriate locations taking into account risk assessments, hazards, work patterns, number of workers and access to local treatment services;
- Sufficient first aid cover, taking into account detailed risk assessment;
- First aiders trained in relation to site specific situations/ hazards and updated on the basis of accident data review;
- First aiders to have awareness of emergency response requirements.;
- Sufficient emergency medical staff cover, taking into account detailed risk assessment and speed of access to local off site emergency services;

- Sufficient emergency medical staff trained, in line with UK best practice, and able to manage site specific issues;
- Staff responsible for ensuring appropriate facilities, equipment, staff and first aid cover available;
- Emergency medical staff responsible for liaison with offsite emergency services as appropriate to this contract; and
- Regular liaison and planning with appropriate local offsite emergency services e.g. London ambulance service, helicopter emergency services and the hazard area response team..

19.4.9 Alcohol and Drugs

The *Contractor* shall enforce a strict alcohol and drugs policy across the contract that shall apply to all persons engaged on the *works*.

19.4.9.1 Policy

The *Contractor's* Drug and Alcohol policy shall be equivalent in effect to the *Employer's* Drugs and Alcohol Policy (Document Number CR-XRL-Z2-PCY-CR001-Z-50002) attached, related procedures and as specified within this document or as issued to the *Contractor* from time to time. It shall apply to all persons engaged on the works whether based within the Site and/or the Working Areas or travelling to and from the Site and/or the Working Areas in connection with the *works* (for example van, lorry and other delivery drivers).

Drugs

For the purpose of this document, the term 'drugs' includes:

- Controlled Drugs as defined in the Misuse of Drugs Act 1971 (comprising Class A, Class B and Class C drugs)
- Drugs that are taken for a reason other than for a medically prescribed purpose
- Drugs which have been prescribed by a registered medical practitioner, e.g. for a diagnosed health condition.
- Drugs that can be purchased over the counter, e.g. pain relieving tablets (Paracetamol) or hay fever relief
- Any other substances which can affect performance e.g. solvents and glues.

The *Contractor* is required to operate a zero tolerance approach to the misuse of drugs. In addition the Contractor shall ensure that no Controlled drugs as described

above shall be brought into, or consumed by any person within the Site and/or Working Areas and associated welfare facilities or while delivering Equipment or Plant and Materials.

Alcohol

The *Contractor* is required to ensure all personnel engaged on the Project take a responsible approach to alcohol.

- Individuals must not report for duty under the influence of alcohol.
- Alcohol must not be consumed while at work or while on call
- Alcohol must not be consumed during meal/rest breaks in the working day
- Alcohol levels must not exceed those stated in section 19.4.9.4
- Alcohol should not be consumed in the eight hours immediately before starting work

As a guide no more than seven units of alcohol should be consumed in the sixteen hours before that eight hour period commences. However please note that consumption levels are affected by gender, body mass index, metabolism and prescribed medication.

Individuals

The *Contractor* must ensure that employees, subcontractors and visitors are aware of their responsibility to inform management (Managers/Supervisors) if they are taking prescribed medication or over the counter medication e.g. Paracetamol or Ibuprofen preparations. This is to enable management to decide (with appropriate professional advice from their OH service) whether the medication will have a negative impact on the individual's ability to perform their duties.

The *Contractor* shall advise the *Project Manager* of any personnel who are 'safety critical' and are under any form of prescription medication without delay and comply with any direction given

19.4.9.2 Drug and Alcohol Testing

The *Contractor* shall operate a comprehensive drug and alcohol testing programme and must ensure that all persons engaged on the works cooperate with the testing

programme by making themselves immediately available on request for a test required either by the *Contractor* or by the *Project Manager*.

The *Contractor* shall ensure that all persons tested have given explicit consent to testing and processing of such data by signing a consent form. The consent form should indicate the outcome of the testing may be shared with the *Project Manager*, the *Employer* and other organisations engaged on the Project for the purpose of ensuring that they are excluded from the Project on grounds of safety if a test is failed or refused. Further advice may be obtained from the *Employer*.

The consent form, as a minimum must contain the following text:

“I freely give my consent:

1. to the test;
2. for the results of the test to be forwarded to my employer/prospective employer; and
3. if I fail the test, for the test results to be forwarded to Crossrail Limited, and shared with other contractors on the Programme.

I also understand that, if I fail the test, I will be excluded from the Programme. “

In addition it should include a copy of the Crossrail Privacy Statement:

“Crossrail Limited operates in accordance with the Data Protection Act 1998. Crossrail Limited and its contractors will process the personal information you have provided solely for the purpose of compliance with Crossrail Limited’s Drugs and Alcohol Policy. We may share this information with other companies engaged on the Crossrail Project for the purposes of compliance with this Policy only. All your personal data in respect of this test will be deleted six months after the date of the test.”

The tests shall screen alcohol levels and look for the presence of drugs including cannabis, amphetamines, cocaine, benzodiazepines, barbiturates, ecstasy (MDMA), heroin, methadone, opiates, ketamine and other substances which meet the definition of drugs.

Drug and Alcohol testing will be undertaken for:

- Pre Placement screening at Induction*
- Random Screening**
- For Cause/Post Incident screening
- On visitors attending the worksite if their behaviour indicates a need to test

* London Underground Ltd, Network Rail, Docklands Light Railway, and utility company employees and their subcontractors who are engaged in work not

contracted by the *Contractor* will have already been tested in accordance to the requirements of their own regime/agreement, and therefore will not be subject to the pre-placement testing programme. Any *Contractor* testing arrangements affecting London Underground Ltd, Network Rail or utility companies that exceed this standard will be managed by the *Contractor*.

** If a London Underground Ltd, Network Rail, Docklands Light Railway or utility company employee, or their subcontractors are selected by the Contractor for random testing; their respective employer shall be informed and shall make arrangements for a test to be completed. The employee shall be stood down from working at a Crossrail site until a test has been arranged by their employer and non positive results evidenced

Learning Legacy Document

19.4.9.3 Testing Method

Collection and analysis of test samples (screening stage)

The *Contractor* must ensure that test samples are collected by suitably trained persons using either:

- The laboratory chain of custody protocol or
- The drug point of care (POCT) collection/ Alcohol Breathalyser protocols. Strict protocols as laid down by the kit manufacturers must be followed.

Where point of care testing is undertaken, as a minimum 11 bar kits must be used which test for all substances as listed above.

Where laboratory chain of custody protocol is undertaken, a suitably trained collection officer will collect samples and ensure they are securely transported and stored before analysis.

All methods will ensure that samples are tamper proof and correctly labelled before testing. There will be safeguards in place to ensure that the reported results can be related to the correct individual.

Confirmation stage of point of care test non negative result

Where the point of care/breathalyser protocol has been followed and there are concerns (Non negative result) with the result, a sample must be sent to the laboratory using chain of custody protocols. Individuals should be suspended from duty on full pay pending confirmation of the laboratory result. Fastrack laboratory testing, at additional cost, may be considered.

Positive results should only be recorded as such on the Drug and Alcohol Register following laboratory test confirmation.

Laboratories used for drug and alcohol analysis will be:

- a) UKAS (or European equivalent) accredited to IOS/IEC 17025:2005
- b) Subject to blind analysis testing under an external quality assurance scheme.

19.4.9.4 Positive test results

A positive result will be recorded when:

- More than 29 milligrams of alcohol in 100 millilitres of blood
- 13 micrograms or above of alcohol in 100 millilitres of breath
- More than 39 milligrams of alcohol in 100 millilitres of urine

- An individual avoids or refuses to undertake a test
- A test sample has been deliberately interfered with, contaminated, altered or corrupted by the individual being tested

19.4.9.5 Consequences of positive results

If a positive drug and alcohol test result is recorded as per the criteria above, this will constitute a failure and the *Contractor* shall immediately exclude that person from the Site and/or the Working Areas.

The *Contractor* shall report to the *Employer*, with a copy to the *Project Manager*, as per procedure by entering information onto the Drug and Alcohol Register immediately. The *Contractor* shall enter the following Information on the Drug and Alcohol Register:

- Date of test
- The name, national insurance or passport number of the person who has failed a test
- A copy of the test result
- A copy of the consent form signed for the person who has failed a test

In the case of any person engaged on the works who has refused to take a test, details to be entered on the register are:

- The name and details of that person together with written confirmation of termination of employment or of engagement on the contract.

If the *Contractor* is unable to access the Drug and Alcohol Register for any reason, he shall immediately provide the information listed above to the *Employer* by emailing the details (including a copy of the signed consent form) to D&ARegister@crossrail.co.uk. The *Employer* will arrange for those details to be added to the Drugs and Alcohol Register.

The Drugs and Alcohol Register contains details of all individuals who have failed a drugs and alcohol test or refused to take a test and remain subject to a period of exclusion from the Project. The period of exclusion will be six months.

The *Contractor* shall ensure that it does not permit any person on the current version of the Drugs and Alcohol Register to be engaged on the *works* or allowed into the Site and/or the Working Areas.

Access to the Drugs and Alcohol Register will be tightly controlled. The *Contractor* shall notify the *Project Manager* of the names and contact details of the individuals responsible for ensuring that persons who are excluded from the Project are not engaged on the *works*. The *Employer* will ensure that the notified individuals are given access rights to the Drugs and Alcohol Register. The *Contractor* shall notify the *Project Manager* immediately a notified individual is no longer responsible for

ensuring that persons excluded from the Programme are not engaged on the *works* and will notify the *Project Manager* of the name and contact details of the individual who will assume that responsibility. The *Contractor* shall ensure that such individuals use the sensitive personal data contained in the Drugs and Alcohol Register solely for the purpose set out above.

The *Contractor* shall ensure that the responsible individuals use the sensitive personal data contained in the Drugs and Alcohol Register solely for the purpose set out above..

19.4.9.6 Reporting

The *Contractor* shall report to the *Project Manager* on a periodic basis, the number of drug and alcohol tests which have been carried out, the number of failures and the consequential action taken in each case.

19.4.9.7 Not Used

19.4.9.8 Not Used

19.4.9.9 Not Used

19.4.10 Welfare Arrangements and Hygiene

The *Contractor* shall provide quality welfare facilities to support the overall occupational health programme. Welfare facilities must be established and in working order before any works on site commence. All toilet, washing, changing, personal storage and rest areas must be easily accessible and have adequate heating, lighting and ventilation. Facilities may need to be provided at more than one location on a large site to ensure workers have easy access.

The *Contractor* shall provide arrangements to ensure good hygiene standards throughout the welfare and office facilities provided. As a minimum the *Contractor* shall ensure that all of the following are provided before commencement of the works:

- washing facilities (including provision of barrier and after care skin treatments, etc);
- facilities for storage and drying of work wear;
- rest facilities;
- designated smoking areas;
- drinking water;
- general maintenance and cleaning; and
- welfare vehicles / temporary facilities.

The *Contractor* may use portable toilet/wash facilities on sites where the duration of works does not exceed seven days.

Special welfare and hygiene arrangements shall be provided as necessary in compliance with relevant specific legal requirements such as lead and asbestos, etc.

19.5 Construction Site Risk Management

19.5.1 Risk Management

The *Contractor* shall undertake assessments of the health, safety, security and fire risks involved in work activities and implement appropriate preventive and protective measures in accordance with the relevant health, safety and environmental legal requirements including Regulatory Reform Fire Safety Order, and the Management of Health and Safety at Work Regulations.

The *Contractor* shall consider transport and Equipment movements to and from the Site and/or the Working Areas and how they may impact third parties and the general public (for example abnormal loads and traffic routes past sensitive locations such as schools). These aspects shall be detailed in the *Contractor's* Traffic Management Plan)

For any work to be undertaken at sites and/or on property owned or controlled by Others, work that has the potential to impact such properties or where activities are assessed as being a high potential health or safety risk to such the *Contractor* shall submit method statements and health and safety risk assessments to the *Project Manager* for acceptance.

19.5.2 Method Statements, Work Package Plans and Risk Assessments

Prior to any work being undertaken in the Site and/or the Working Areas, including sites and/or on properties owned or controlled by Others, the *Contractor* shall produce task-specific method statements and health and safety risk assessments. The *Contractor* may use the work package plan system as an alternative to method statements but must ensure that these are acceptable to the *Project Manager* for the works. Where work is covered by generic risk assessments, the *Contractor* shall include copies of these in the Construction Phase Plan prior to commencement of the works onsite. During the works, the *Contractor* shall review any relevant generic risk assessments against the task and conditions on site and modify them where appropriate. The *Contractor* shall provide the *Project Manager* with copies of modified and task-specific risk assessments for acceptance.

Within four weeks of the *starting date*, the *Contractor* shall submit to the *Project Manager* for acceptance a preliminary method statements schedule including the following:

- list of method statements that will be produced throughout the works and the relevant work activities;

- indication if the relevant work activities impact assets or properties owned or controlled by Others, or the public;
- rating of the potential health or safety risks of the relevant work activities; and
- method statements submission programme.

In the case of the first submission of the preliminary method statements schedule the *Project Manager* will reply within 4 weeks of the date of submission. Any revisions, submissions and responses regards the preliminary method statements schedule shall be made within the period for reply.

The *Contractor* shall provide further submissions of the schedule when additional method statements are identified or the schedule of method statements change. The *Project Manager* shall specify the method statements requiring review and acceptance based on the potential health, safety or environment risks of the relevant work activities and their impact on Others.

Up to and for the first three months following the commencement of the *works* the *Contractor* shall submit method statements for review and acceptance by the *Project Manager* a minimum of four weeks prior to activity commencing. The *Contractor* may submit an alternative submission timescale for activities after the first three months of the *works* for the acceptance of the *Project Manager*. The *Contractor* shall not start the relevant works activities until the *Project Manager* has accepted the method statement.

Where the method statements will require review by Others, the *Contractor* shall submit the method statement to the *Project Manager* six weeks prior to work commencing..

19.6 Construction Design & Management (CDM) Regulations 2007

19.6.1 General

The Programme and Project will be delivered through a number of separate contracts each with obligations under the CDM Regulations. Although each of these contracts will be independent, they will be managed as part of an overall programme of works with close coordination and cooperation between them.

Each contract will be independently managed with the respective CDM Regulations duty holders appointed via a documented process, which will verify that adequate and competent resources are available for each duty holder to discharge their duties under the CDM Regulations.

For contracts where the *Employer* is the appointed Client under CDM Regulations the *Employer* shall also be the CDM Coordinator, represented by a nominated Crossrail Director, unless otherwise stated.

19.6.2 Not Used

19.6.3 Responsibilities of the *Contractor* for Design

19.6.3.1 General

Where the *works* include a requirement for the *Contractor* to design part of the permanent works and for all temporary works designed by the *Contractor* the *Contractor* fulfils the obligations of a designer under the CDM Regulations and the *Employer's* Designing for Health & Safety Procedure (Document Number CRL-PDP-Z7-GPD-CRG03-00011) attached at Appendix 19N.

19.6.3.2 Co-operation with the CDM Co-ordinator

In accordance with the CDM Regulations, the *Contractor* shall take all reasonable steps to provide sufficient information to assist the CDM Co-ordinator to comply with his duties.

The *Contractor* shall designate a lead coordinator whose duties include:

- providing coordination and ensuring cooperation with the CDM Co-ordinator throughout the health and safety management of the design process;
- arranging design review meetings and workshops with the *Project Manager*, *Employer* and Others responsible for design of the *works*; and
- to ensure the cooperation of the *Contractor's* design team to eliminate or mitigate risks and ensure that full coordination and cooperation is achieved with other relevant works designers & contractors.

19.6.4 Responsibilities of Principal Contractors and Contractors

The *Employer* has assessed which contractors will be a Principal Contractor and which contractors will be a 'contractor' in accordance with the CDM Regulations for each site and the duration of the role.

Works Information Volume 2A describes the interfaces with Others for this contract and the sites and durations for which the *Contractor* will be Principal Contractor or a contractor.

19.6.4.1 Principal Contractors

In accordance with its duties under the CDM Regulations, the appointed Principal Contractor shall be responsible for planning, managing and monitoring the construction phase of the *works* including the work to be completed by Others with whom the Principal Contractor shares the worksite.

Without limitation to its duties under the CDM Regulations, where Principal Contractor shares the worksite with Others, the Principal Contractor shall:

- provide site inductions including a 'Welcome to Crossrail' induction;

- issue security passes and control site access;
- review risk assessments and method statements and incorporate plans into the Construction Phase Plan;
- ensure suitable welfare facilities are provided from commencement of the *works* and maintained throughout the construction phase; and
- collate information for the health and safety file.

The Principal Contractor shall also:

- check competence of all their subcontractors and suppliers and where a party is novated to them to ascertain whether adequate checks upon competency were carried out and maintain records of such checks;
- plan, manage and monitor the construction phase in liaison with subcontractors and suppliers of any tier and other contractors with whom he shares the Site and/or the Working Areas;
- prepare, develop and implement the construction phase plan and provide subcontractors and suppliers of any tier and other contractors with whom he shares the Site and/or the Working Areas with relevant parts of the plan
- co-operate fully with the assurance activities of the *Project Manager*.

19.6.4.2 Contractors

In accordance with its duties under the CDM Regulations, the appointed contractor shall cooperate with the Principal Contractor responsible for planning, managing and monitoring the construction phase of the *works* for the worksite.

Without limitation to its duties under the CDM Regulations, the *Contractor* shall:

- check competence of all their appointees
- ensure that all employees and persons under its control attend the Principal Contractor's site induction and other safety briefings;
- comply with the Principal Contractor's security requirements;
- submit risk assessments and method statements to the Principal Contractor simultaneously with submissions made to the *Project Manager* (as per 19.5.2);
- notify the Principal Contractor of any subcontractor's it has employed for the *works*;
- provide information the Principal Contractor requires for the health and safety file; and

- co-operate fully with the assurance activities of the *Project Manager*.

19.6.5 Construction Phase Plans

The *Contractor* shall submit to the *Project Manager* for acceptance a Construction Phase Plan that shall comply with the CDM Regulations and the health and safety performance and monitoring requirements stated in the Works Information.

The submissions of the Construction Phase Plan shall cover as a minimum the following phases:

1. Mobilisation
2. Start of Works
3. Other phases, to be determined by the *Contractor*.

The *Project Manager* will reply within four weeks of the date of submission. Any revisions, submissions and responses shall be made within the *period for reply*. The submissions must be accepted prior to the relevant phase of the *works*.

The *Contractor's* Construction Phase Plan shall comply with the "Managing Health and Safety in Construction: Construction (Design and Management) Regulations 2007" approved code of practice published by the Health and Safety Commission and describe as a minimum, the following:

- the *Contractor's* proposals to implement the *Employer's* Target Zero programme on this contract addressing the Crossrail Golden Rules;
- the *Contractor's* health and safety objectives identifying how these align with the *Employer's* Target Zero programme;
- the *Contractor's* health and safety management structure and roles and responsibilities of individuals within the organisation;
- how the *Contractor* proposes to manage interfaces between subcontractors and suppliers and with other contractors with whom it shares the Site and/or the Working Areas;
- hazards and risks advised by designers, the *Project Manager* and Others;
- identification of hazards and the evaluation of significant risks associated with the site and work activities;
- development of methods for dealing with those hazards (e.g. employ a hierarchy of risk reduction as described in the approved code of practice) with a focus on arrangements designed to protect all construction personnel and others who may be exposed;

- documentation of methods for risk control in the form of risk assessments and associated health and safety plans and method statements;
- development and adoption of method statements that address sequencing, work methodology and controls/ precautions to protect site personnel along with anyone else who may be affected;
- maintaining of the risk assessments and associated health and safety plans and method statements incorporating and communicating any changes required to reflect changes such as those associated with site conditions and work scope;
- proposal for amendments to the *Contractor's* hazard and risk register, through the *Project Manager* where relevant;
- communication of the risk control arrangements to the *Contractor's* own personnel, to the *Project Manager* and to Others who may require this information for their own safety and security and to ensure efficient operations;
- review of training plans including toolbox talks and briefings with reference to risk control. ensuring that changes are communicated appropriately
- briefing on applicable method statements to all personnel at the point that they commence the work covered by each method statement and provide update briefings where a method statement is amended;
- throughout this process for developing and implementing risk management arrangements, to ensure effective liaison with the *Project Manager* and the active engagement of the contract team;
- management issues including responses to accidents, incidents and emergencies; and
- the Target Zero leadership culture including behavioural safety activity, leadership tours and other initiatives; and
- a health and safety improvement plan aimed at improving health and safety at a construction worker level, with meaningful objectives and actions and measurable outcomes in terms of health and safety performance.

19.6.6 Health and Safety File

The *Contractor* shall develop the Health & Safety File in accordance with the format agreed with the *Project Manager*..

Four weeks prior to Completion of the whole of the *works* or any section of the *works* the *Contractor* shall submit information required for the production of the health and safety file for the relevant part of the *works* to the *Project Manager* for acceptance.

19.6.7 Specific Health and Safety Hazards

The *Contractor's* Construction Phase Plan shall include plans and procedures to address the following specific health and safety hazards:

- the hazards addressed within the Crossrail Golden Rules;
- safety issues associated with higher risk activities (for example temporary works, buried services, work at height, confined spaces, demolition, working adjacent to moving plant and machinery, lifting operations, vehicle movements, work adjacent to wharfs and rivers, work on or adjacent to operational railway lines);
- Project wide issues including fire, security, site transport, slips, trips and falls and welfare facilities;
- tunnelling and related underground works;
- health hazards including asbestos, noise, vibration, hazardous substances, muscular-skeletal issues, Leptospirosis, waste storage and handling, anthrax.

19.6.8 Procurement and Supply Chain Management

The *Contractor* shall ensure the assessment of health and safety competence and performance are key criteria in the selection of subcontractors and shall form part of the *Contractor's* procedure for procurement of subcontractors. The *Contractor* shall ensure only competent subcontractors capable of complying with and sufficiently resourcing the relevant subcontract scope shall be engaged.

During the procurement process and after the appointment of subcontractors, it is the *Contractor's* responsibility to ensure that subcontractors are aware of and understand the requirements of the health and safety requirements stated within this part of the Works Information. The *Contractor* shall manage the interface between his subcontractors to ensure compliance with the health and safety requirements set out in this part of the Works Information and shall monitor and report health and safety performance periodically to the *Project Manager*.

19.6.9 Health and Safety Reporting

19.6.9.1 General

The *Contractor* shall provide suitable and sufficient resources to collate and input health safety and security performance data in the *Employer's* IMS-Rivo Safeguard database and shall ensure that the data is update on a period basis. The *Contractor* shall provide reports on the following key performance indicators to the *Project Manager* each reporting period:

- Incident information and data;
- Security and crime;
- Hours worked (non-manual and manual);

- Leadership tours performed (planned and completed);
- Behaviour observations performed (Safe and At risk %);
- Details of site H&S Inspections
- Audits (planned and completed %);
- Site Inspections (planned and completed %);
- Corrective Action Reports (CAR's);
- Health performance (drugs and alcohol testing (planned and completed %) including details of number of failures;
- Notable best practice (Health Safety Environmental & Security);
- Number of site managers on site and number certified to CITB Site Manager's Safety Training Scheme (SMSTS or equivalent) standard; and
- Number of site supervisors on site and number certified to CITB Site Supervisor's Safety Training Scheme (SSSTS or equivalent) standard.

19.6.10 Not Used

19.6.11 Not Used

19.6.12 Not Used

19.6.13 Not Used

19.7 Construction Site Management of Health, Safety and Environment

19.7.1 Access and Security

The *Contractor* shall control access to the Site and/or the Working Areas and passage between zones within the Site and/or the Working Areas in accordance with the requirements of the Works Information.

19.7.1.1 Site Induction/Training

The *Contractor* shall ensure that all employees, visitors, subcontractors and suppliers of any tier and other contractors working in the Site and/or the Working Areas attend a site induction and other training appropriate to the work taking place in the Working Areas before the person starts work in or enters the Site and/or the Working Areas.

Generally the three types of induction and/or training necessary are Programme, site specific and job role.

The *Contractor* shall provide inductions specifically for visitors (see item 19.7.1.3 below).

The *Contractor* shall also provide specific induction and training for construction management and supervisory staff.

For safety critical work and access to sites and property owned or controlled by Others further training requirements may be required, these include (but are not necessarily limited to) those described in:

- Works Information Volume 2A;
- Works Information Volume 2B Part 10 Network Rail Interface;
- Works Information Volume 2B Part 11 London Underground Interface;
- Works Information Volume 2B Part 12 Docklands Light Railway Interface; and
- Works Information Volume 2B Part 26 Logistics Management.

The *Contractor* shall put in place systems that ensure all inductions/training are implemented effectively and that the persons providing inductions have received adequate training to do so.

The *Contractor* shall ensure that access to the Site and/or the Working Areas and construction zoned areas is restricted to individuals who have received an appropriate level of induction and training and who are supervised according to the level of induction and training received.

The *Contractor* shall maintain a written record of attendance for inductions and safety briefings. This record shall be made available to the *Project Manager* on request.

19.7.1.1 Programme Induction

The *Contractor* shall provide an induction to the Crossrail Programme, including a health and safety section, to all personnel who will be working in the Site and/or the Working Areas, irrespective of employment status. This induction is called “Welcome to Crossrail” and will be provided by the *Employer* for the use of the *Contractor*. “Welcome to Crossrail” shall cover an overview of the Programme and the mandated health and safety requirements that shall apply across all personnel working in or visiting the Site and/or the Working Areas.

“Welcome to Crossrail” is a modular programme that can be adapted to suit the needs of different audiences.

The *Contractor* shall be responsible for delivering “Welcome to Crossrail” to all site workers. The *Contractor* shall be provided with a pack of information containing a memory stick with videos and slides along with guidance notes. The *Employer* will provide regular updates to the pack to ensure the information remains current, relevant and interesting.

The *Employer* will provide support to the *Contractor* in the form of training to the trainers/briefings to ensure that the *Contractor’s* presenters are able to deliver “Welcome to Crossrail” successfully. The *Project Manager* and *Employer* will

monitor the consistency and quality of delivery through planned and unplanned visits to site inductions.

“Welcome to Crossrail” shall provide information on:

- Crossrail's past, present and future;
- the Crossrail 'family' and who is involved in delivering Crossrail;
- Crossrail's vision and values; and
- Target Zero programme and key messages on health, safety, security and the environment

“Welcome to Crossrail” shall last for approximately 45 minutes.

19.7.1.1.2 Site Specific

A site-specific induction, managed by the *Contractor*, should be delivered directly after “Welcome to Crossrail”.

The *Contractor* shall ensure that all employees, before they start or upon arriving at new locations/ sites receive the site-specific induction and are fully briefed by the relevant manager on the site specific health and safety and environmental controls including first aid, fire, emergency and accident procedures as identified in the Incident Plan (See Works Information Volume 2B Part 8 Incident Reporting), welfare facilities and other relevant procedures and controls.

This training shall cover as a minimum the following:

- site health, safety and security rules inc. Security Pass and PPE issue;
- the Crossrail Golden Rules and local application of the consequence management procedure (Crossrail Golden Rules information shall be provided to all persons during the induction);
- commitments and undertakings including traffic management arrangements and the Considerate Constructors Scheme;
- environmental responsibility e.g. noise, pollution, use of resources;
- the need for quality workmanship and inspection;
- site housekeeping;
- working safely and reporting of concerns;
- general site safety requirements;
- welfare arrangements; and

- competency/ training

Contractors are advised to ensure inductions incorporating *Employer* information and site-specific requirements are scheduled effectively to ensure a captive audience. Lengthy repetitive induction programmes can have a negative impact on material and core message, and requirements being delivered.

19.7.1.1.3 Job Role

The *Contractor* shall provide specific health and safety and environmental training for employees commensurate with the risks identified and in accordance with their training and development plans.

The *Contractor* shall provide sufficient information, instruction and training to ensure that all employees, and subcontractors and suppliers of any tier are competent in their health and safety and environmental duties.

The *Contractor's* supervisors and managers whose duties involve the direction and supervision of staff and site operatives shall be given training on their health and safety responsibilities and how to discharge them.

19.7.1.2 Construction Skills Certification Scheme

With reference to the security zoning requirements contained in Part 16 Security of Volume 2B of the Works Information, the *Contractor* shall ensure that all employees, visitors, subcontractors and suppliers of any tier and other contractors entering Security Zones 1 and 2 within the Site and/or the Working Areas are in possession of a valid Construction Skills Certification Scheme (CSCS) card. The *Contractor* shall ensure that the CSCS card held by individuals is appropriate to their specific role on the Contract.

An exception to this requirement is granted where the individual holds a valid card from a CSCS affiliated or amalgamated scheme (see Appendix 19D) or other Programme accepted scheme which has been assessed as meeting similar standards.

All persons working on Crossrail projects whether for the *Employer* or any contracting company, must hold a valid CSCS card (or equivalent).

The *Project Manager*, may in exceptional circumstances grant a short duration exemption for visitors or technical staff providing that they are escorted at all times by a person competent and authorised to be in the area and where a documented risk assessment has been completed which is authorised by the Principal Contractor. Others who would be exempt are; HSE or other enforcing body representatives, members of the emergency services, LU, DLR and NR staff attending to their assets or visiting the site, utility company representatives attending site under their statutory utility powers (usually carrying a pink card) or others who may from time to time be granted exemption by the *Project Manager*.

Persons joining the project from overseas must have evidence of competence for their particular skill, which the Principal Contractor has verified.

The Principal Contractor must maintain a register of all such persons and be confident that they understand the health & safety requirements of the project. They must be able to show evidence for audit that all such persons are applying for the relevant CSCS card and must as a minimum hold the visitors card within two months of starting on the contract.

19.7.1.3 Induction Arrangements for Visitors

The *Contractor* shall have arrangements in place to provide visitor inductions which shall include a summary of the following aspects:

- Site health and safety arrangements;
- Incident reporting procedures;
- Identification of key personnel and their roles and responsibilities;
- Crossrail Golden Rules;
- Target Zero Principles;
- Drug and Alcohol Policy;
- Site Incident Plan
- Site environmental arrangements; and
- Site security arrangements.

The *Contractor* shall submit the content of visitors inductions to the *Project Manager* for acceptance.

19.7.1.4 Tunnel Safety Card (TSC)

The *Contractor* shall ensure that all individuals employed on the relevant tunnelling works (including without limitation subcontractors and suppliers of any tier) who will be required to enter underground construction and fit-out areas (TBM drives, shotcrete lining works and their associated shafts to include existing tunnels being refurbished) are in possession of a valid Tunnel Safety Card. The *Contractor* shall only use training providers who are accredited to provide Tunnel Safety Card training programmes and/or testing, such as the National Construction College (the training division of construction skills) currently associated with The Underground Training Academy (TUCA).

19.7.2 Information, Training and Supervision

19.7.2.1 Information

The *Contractor* shall ensure that:

- health and safety records relevant to the works, including induction, training and Equipment inspection and testing records, shall be kept in the Site and/or the Working Areas (including site office) and be available for inspection on request;
- copies of all relevant health and safety information to particular site activities is held by the team carrying out the work including method statements, risk assessments, written briefings and safety alerts/bulletins;
- site safety briefings are provided to all persons carrying out work tasks subject to method statement, risk assessments and permit controls, and written records maintained of briefings signed by all persons carrying out the tasks; (These briefings shall be completed daily and when the task or condition changes)
- the *works* are suitably supervised at all times and that operatives are aware of the person supervising their work activities and their whereabouts at all times; and
- supervisors receive induction on the health and safety requirements and of their specific responsibilities for health and safety aspects.

19.7.2.2 Training

Competence through knowledge, training and information is one of the key steps within the *Employer's* Target Zero programme. The *Contractor* shall implement an acceptable training regime to ensure that employees, subcontractors, suppliers and others under his control are sufficiently trained and understand the risk controls and behaviours expected.

The *Contractor* shall prepare and implement a training programme that takes account, as a minimum, of tasks, environment, behavioural and cultural influences, language, and best practice / lessons learned. This training programme must include a comprehensive briefing process that ensures all employees have been given a briefing on the task risks and controls prior to beginning any work activity.

The *Contractor* shall identify training needs for all personnel and ensure that appropriate training is provided. The training shall include "toolbox talks" for site operatives to maintain an appropriate level of awareness on applicable topics and to advise employees of changing circumstances as work progresses. Records of attendance are to be kept and tracked.

19.7.2.3 Supervision

The *Contractor* shall ensure that competent persons supervise and manage the *works* at all times, in accordance with the *Employer's* Target Zero supervision requirements. The arrangements shall specifically address the supervision of new-to-site personnel and any others at particular risk. The arrangements shall also include those for addressing foreseeable emergencies. The supervisory arrangements shall be reviewed for adequacy and suitability in connection with any lone or isolated work.

Persons appointed to supervisory and management positions shall be experienced in the management of health and safety on construction projects and shall have received adequate training and induction for their role on this contract. Training and induction shall include demonstration by example of good practice and the impact of poor practice.

All persons employed by the *Contractor* who have supervisory responsibilities for others (including those from subcontractors and suppliers of any tier) must hold a current CITB site supervisors safety training scheme certificate (or equivalent accepted by the *Project Manager*). Persons considered to have supervisory responsibilities are those involved in the direction of day to day work activities with direct responsibility for putting people to work. They will typically brief the workers on how to carry out their work and ensure that they are carrying out their work safely.

The *Contractor* shall ensure that supervisors have attended a minimum one-day course related to recognising safe and unsafe behaviours. The *Employer* has developed a packaged course entitled “Leadership in Action” that will be made available to the *Contractor* on a train the trainer basis. The *Contractor* shall use this course or provide a course that covers the subject matter of this course as representative of a minimum standard of training.

All persons employed by the *Contractor* who are responsible for managing a site or managing the activities of others (including those from subcontractors and suppliers of any tier) must hold a current CITB site manager safety training scheme (SMSTS) certificate or CITB site supervisors safety training scheme (SSSTS) or equivalent accepted by the *Project Manager*. Persons having management responsibilities are considered to be construction directors, construction project managers, site agents, sub-agents, site managers/engineers, and senior supervisors such as general foreman and works managers.

19.7.2.4 HSE Forums

The *Contractor* shall be invited by the *Employer* and *Project Manager* to attend HSE Forums and events as part of the overall Safety Programme. The purpose of these forums or events is to stimulate engagement, learning opportunities and share lessons learnt and best practices between all members to assist developing and shaping the zero accident culture.

19.7.3 Vehicle Safety Management

The *Contractor* shall ensure they have a robust vehicle safety management plan to manage the movement of vehicles to and from the Site and/or the Working Areas and within the Site and/or the Working.

19.7.4 Foreign Workers

The *Contractor* shall ensure its workforce fully understands the contract health and safety requirements including emergency arrangements and the application of the Crossrail Golden Rules. The *Contractor* shall have adequate arrangements for communicating health and safety information to non-fluent English speakers on site. These arrangements shall include:

- ensuring a translator is available who is capable of instructing the non-English speaking personnel in safety and other operational matters; and
- maintaining a ratio of not greater than four non-English speaking personnel to each translator at all times.

Special provisions for safety critical instructions conveyed by the translator shall be recorded as being received and clearly understood by non-fluent English speakers. Such records shall include those for safety induction, emergency procedures, safety method statements and safety awareness talks.

19.7.5 Confined Space

The *Contractor* shall ensure that a safe system of work is identified that documents all hazards, safety precautions and safe working practices associated with all confined space activities performed by employees.

A written risk assessment and method statement will be prepared by the *Contractor* to identify the controls required for a safe operation. The risk assessment and method statement will include the confined space entry permit and the control systems required for working in confined spaces.

The *Contractor* shall evaluate the workplace to determine which spaces (if any) are confined spaces and develop a safe system of work in accordance with The Confined Space Regulations and INDG258 Safe work in Confined Spaces.

The *Contractor* shall ensure their safe system of work includes:

- checks that employees are medically fit and competent to enter a confined space and have received adequate training;
- an adequate communication system to enable clear communication between those inside and outside of the confined space;
- testing and monitoring of the atmosphere within a confined space for hazardous gas, fume or vapour and checks on the concentration of oxygen prior to entry;
- a permit-to-work system which requires a formal check to ensure all the elements of a safe system of work are in place before personnel are allowed to enter or work in a confined space;
- the provision of safe way in and out of the confined space that allows for quick, unobstructed and ready access and egress;
- a requirement for the *Contractor* to check to ensure that the isolation of all mechanical and electrical is effective and if gas, fume or vapour could enter the confined space, physical isolation of pipe work etc is made;
- a requirement for emergency arrangements to be in place before any person enters or works in a confined space, and contingency plans appropriate to the

nature of the confined space, the risks identified and consequently the likely nature of an emergency rescue;

- a process for revising the safe system of work to correct its deficiencies and/or procedures before subsequent entries are authorized; and
- particular considerations where confined space access has additional hazards (for example tunnel boring machine interventions under compressed air)

19.7.6 Working at Height

The *Contractor* shall ensure a robust safe system of work is in place for any activities involving working at height where there is a risk of a fall liable to cause injury. The *Contractor* shall:

- eliminate the need to work at height where reasonably practicable;
- develop suitable and sufficient risk assessments for working at height;
- ensure that the work is properly planned, and appropriately supervised;
- provide training and awareness sessions and ensure all employees involved in working at height activities are competent to do so;
- select the appropriate Equipment for the task and ensure collective measures take precedence over personal protective measures (i.e.; fall prevention Equipment);
- Ensure that appropriate emergency plans are in place and tested to enable suspended person(s) to be safely quickly retrieved;
- implement an inspection and testing regime for all Equipment identified as assisting in any working at height operation that is compliant with statutory regulations;
- Maintain records of Equipment inspections; and
- comply with all relevant BS and EN standards and codes of practice relating to working at height.

19.7.7 Lifting Operations

The *Contractor* shall produce a risk assessment and lifting plan identifying the nature and level of risks associated with a proposed lifting operation. The *Contractor* will brief the content of the risk assessment and lifting plan to all employees involved in lifting operations. appropriate competence.

The *Contractor* must implement or source adequate training for employees who operate or test/examine lifting equipment. Training records must be kept and where

lifting operations are planned, copies of these records should be submitted to the *Project Manager* with the Construction Phase Plan.

The *Contractor* will ensure that any persons who operate lifting equipment or conduct inspections and examinations are competent to do so and ensure that the safe system of work is in compliance with statutory regulations and the approved code of practice for safe use of lifting equipment published by the health and safety executive.

The *Contractor* shall comply with the Notification of Conventional Tower Crane Regulations 2010 and the guidance notes on complying with the regulations (INDG437) published by the Health and Safety Executive. All lifting operations shall be managed in accordance with BS 7121 is the British Standard Code of Practice for the Safe Use of Cranes.

19.7.8 Excavations

The *Contractor* shall ensure suitable and sufficient planning for excavations to ensure that hazards are identified, and their risk is reduced to as low as reasonably practicable. An excavation work permit system may be required, or the *Contractor's* own permit to work system.

The *Contractor* shall ensure that a risk assessment is performed prior to the commencement of trenching or excavation activities. The *Contractor* shall take reasonable steps to obtain and review survey drawings, utility records and ground penetrating radar survey information on the Site and/or the Working Areas when planning excavation works.

The purpose of the risk assessment is to determine that the proposed excavation is conducted in a manner that minimises the risk of harm to personnel and existing underground services.

Without limiting the requirements for the *Contractor* to complete a risk assessment, the risk assessment shall assess the risks associated with the excavation in relation to:

- existing services and their isolation;
- working at heights, falls of persons, materials, tools and plant;
- personnel;
- potential contamination sources;
- the nature of the work;
- mobile Equipment;
- portable Equipment and tools to be used during the excavation:

- the ground conditions and water table;
- property and structure adjacent to the excavation;
- other Equipment movements within the vicinity of the excavations;
- any gradient on the Site;
- the proximity of the excavations to members of the public and in particular access by children;
- safe access and egress, shoring and stabilisation measures;
- pre-use and during use inspection regime; and
- the potential effect of adverse weather on the excavations.

The *Contractor* shall ensure that site specific excavation and trenching instructions satisfy the requirements of applicable legislation, standards and ACOP HSG47 'Avoiding Danger from Underground Services' published by the Health and Safety Executive, the *Contractor* shall communicate these requirements to employees and Sub-contractors.

19.7.9 Demolition

19.7.9.1 General Requirements

The *Contractor* is responsible for ensuring that any demolition work is undertaken in accordance with the current best practice, British Standard Code of Practice for Demolition 6187:2000 the ICE Demolition Protocol and other applicable standards and legislation.

The *Contractor* shall ensure they undertake an initial survey to establish a baseline for the method statement and controls. This survey shall take account of:

- the presence of adjoining or adjacent properties; for example hospitals where noise, dust or vibration may effect the method of demolition;
- the type of structure and its key elements;
- flammable substances;
- the condition of structural members and the contribution of floors, walls, roofs to overall stability;
- the need for temporary works or shoring;
- confined spaces;
- health hazards such as asbestos, lead, dust or paint, residues from previous

processes, contaminated land or any other occupational health or biological hazard;

- implementation of the controls regarding Asbestos as defined in this Works Information; and
- suitable access for proposed method of demolition and vehicle access for the removal of the waste.

19.7.9.2 Not Used

19.7.9.3 Not Used

19.7.9.4 Hazardous Material and Asbestos

The *Contractor* shall carry out hazardous material and Type 3 asbestos surveys within the structure to be demolished. The survey shall be carried out by a team of experienced and qualified surveyors. Where such surveys were completed by other *Employer's* contractors, the results shall be provided to the *Contractor* by the *Project Manager*.

The survey results shall be available in advance of the demolition works allowing sufficient time for the *Contractor* to plan their safe removal and the method statement to be reviewed and accepted. The removal and disposal of asbestos shall be undertaken in accordance with Control of Asbestos at Work Regulations 2002 and the Control of Asbestos Regulations 2006.

The removal and disposal of other hazardous material shall be in compliance with project environmental and legal requirements.

19.7.9.5 Exclusion Zones

Where practicable, demolition works shall be provided with an exclusion zone. The *Contractor* shall:

- set up exclusion zones around demolition works;
- have a safe system of controlling access into the exclusion zone; and
- have a safe system of controlling changes to the exclusion zone.

Details of the exclusions zones and safe systems of control shall be included in the method statement.

The *Contractor* shall provide upon request assessments to demonstrate that the zones provided will ensure that persons outside the zone will not be harmed as a result of any demolition activity.

Where it is not practicable to set up exclusion zones, the *Contractor* shall propose alternative means of providing protection from demolition works and submit them for the *Project Manager's* acceptance.

19.7.9.6 Permit to Start Demolition

No demolition, including asbestos removal, of any building or structure shall commence until a permit to demolish is approved by the *Project Manager*.

The *Contractor* shall complete and submit to the *Project Manager* for approval a permit to demolish form using the template attached in appendix 19G.

19.7.9.7 Actions in the Event of Unexpected Finds

In the event that ground water, asbestos, hazardous materials or any other situation that impacts the demolition works is found not to be as expected, the *Contractor* shall:

- stop the works affected;
- make area safe and prevent unauthorised access; and
- advise the *Project Manager* and convene a meeting to agree appropriate actions.

19.7.10 Electricity

The *Contractor* shall implement a safe system of work for all electrical cord sets and receptacles not part of the permanent electrical wiring system of a building or structure, and all electrical equipment and tools used in connection with construction activities on the contract, including but not limited to the following:

- electrical Equipment;
- GFCI/ELCB requirements;
- power generators;
- distribution boards;
- hand tools; and
- overhead transmission and railway power lines.

To support the above the Principal Contractor shall also have testing provisions in accordance with section 19.7.18 below and compliant with statutory regulations.

19.7.11 Fire Safety and Prevention

The *Contractor* shall develop, implement and maintain strict housekeeping practices as an integral part of daily activities, and ensure that adequate control measures are implemented to prevent fire.

The *Contractor* shall provide fire prevention and fire precautions training to all employees and those authorized to carry out hot work. The training program will include as a minimum:

- checking portable fire extinguishers;
- hazard recognition and risk potential;
- inspection methods;
- hot work permit requirements;
- emergency fire procedures;
- selection and use of portable fire extinguishers;
- equipment refuelling procedures;
- storage and handling of flammable and combustible liquids; and
- pre- and post- hot works inspections.

In accordance with the Regulatory Reform Fire Safety Order the *Contractor* shall produce fire risk assessments identifying the nature and level of risk for the scope of works.

19.7.12 Manual Handling

The *Contractor* shall ensure that all manual handling operations are identified and documented within a suitable and sufficient risk assessment. Work methods must be designed to eliminate, as far as is reasonably practicable, the need for workers to manually handle any heavy load.

The *Contractor* shall ensure that all employees receive training which includes an overview on back injury prevention, stretching, and correct lifting methods. Back injury prevention will be continually emphasized to supplement initial training (e.g., safety meetings, toolbox meetings, coaching or other methods, etc.).

Topics that can be linked to manual material handling and back injury prevention include, but are not limited to, the following:

- potential hazards (job or task specific);
- unfamiliar handling operations;
- proper use of handling aids (tools, equipment);
- proper use of personal protective equipment;
- the working environment and personnel safety;

- housekeeping;
- factors affecting individual capabilities;
- good handling techniques; and
- ground conditions.

19.7.13 General behaviour

The *Contractor* shall ensure, through its policies, training and supervision that all personnel are aware of basic requirements including:

- respect for good site practice and avoidance of horseplay;
- respect for other people, including no use of foul, abusive or racist language, no aggressive or violent behaviour, harassment or bullying; and
- avoid congregating outside worksite where this could cause concern or disruption.

The *Contractor* shall have explicit policy statements on good site practice, horseplay, harassment and bullying. Such policies shall be supported by a complaints procedure accessible to all.

The *Employer* and *Project Manager* in conjunction with the *Employer's* Target Zero programme shall also develop a detailed manual focusing on industry best practices using pictorial examples where practical ensuring the *Contractor* can implement lessons learnt requirements easily and effectively.

19.7.14 Smoking

Smoking within the Site and/or the Working Areas is prohibited with the exception of designated smoking areas. The *Contractor* shall provide suitably signed designated smoking areas within the Site and/or the Working Areas close to welfare facilities but away from the immediate vicinity of work locations where it is safe to do so and away from site access routes and sensitive neighbouring properties. The *Contractor* shall take all reasonable measures to prevent personnel under his control from smoking on the streets adjacent to sites.

19.7.15 Mobile Phones, Radios and Audio Equipment

Use of mobile phones within the Site and/or the Working Areas is prohibited with the exception of designated areas. The *Contractor* shall provide suitably signed designated areas which shall include offices and welfare/rest facilities. The *Contractor* shall ensure that the use of mobile phones do not create risks to the user or others.

Use of personal radios and portable audio equipment is prohibited within the Site and/or the Working Areas with the exception of welfare/rest facilities.

Mobile phones, including hands free kits or Bluetooth headsets, are banned from use by delivery drivers whilst driving in connection with the Project. This also applies to Citizens' Band (CB) radios and handheld 'walkie talkie' style radio sets.

19.7.16 Personal Protective Equipment

The *Contractor* shall ensure that suitable and appropriate personal protective equipment (PPE), determined by risk assessment, is provided in accordance with the Personal Protective Equipment at Work Regulations (reference HSE L25) and where required that specialist PPE is supplied (defined within HSE guidance HSG47).

The type of PPE utilised shall be specified within the risk assessment after it has been assessed against the specific risks on each worksite. As a minimum the *Contractor* shall provide the following PPE to be worn when working within PPE zones within the Site and/or the Working Areas:

- high visibility upper body clothing with reflective tape which complies with BS EN 471: 2003 class 2 and conforms to the Project PPE branding requirements described in Appendix 19K;
- safety helmet which complies with BS EN 397: 1995 (although an exception may be made for Sikhs wearing turbans, who do not wish to wear a safety helmet on religious grounds, where risk assessment determines that a turban provides adequate protection from the risk of head injury);
- safety footwear which complies with BS EN ISO 20345:2004 and provides support to the ankle, mid-sole protection and has a covered steel toe cap. Rigger boots are not acceptable, and shall not be worn.;
- hand protection that conforms to BS EN388 intermediate design;
- eye protection, safety glasses that conform to BS EN166, 1.F;
- where persons are exposed to working in inclement weather conditions, protective equipment which complies with BS EN 343: 2003 Class 3, 3 shall be provided; and
- for employees working in close proximity to buried services flame retardant PPE which complies with BS EN 533.

The *Contractor* shall ensure that where work is performed on the infrastructure of another party and their PPE requirements exceed these *Employer's* standards then their PPE requirements must be met. All hi-visibility PPE must carry the *Contractor's* logo, as a minimum on the back and conform with the *Employer's* corporate branding requirements.

The *Contractor* shall ensure for task specific activities and activities on non construction sites that the type of PPE required shall be determined by the risk assessment and documented in the relevant method statement or work planning

documentation. Where employees wear glasses the *Contractor* shall consider the use of prescription safety glasses for individuals who require them.

The *Contractor* shall provide suitable and sufficient storage and cleaning facilities for PPE.

In addition to PPE the *Contractor* shall ensure that suitable work wear is worn which will include long trousers and sleeved shirts. The *Contractor* will also ensure that personnel do not wear clothing that could be offensive to Others.

The *Contractor* shall procure PPE from companies who are members of the Registered Safety Suppliers or similar scheme to reduce the risk of procuring counterfeit or substandard products and ensure that products are procured from ethical sources.

19.7.17 Construction Equipment

The *Contractor* shall ensure that all Equipment operators hold a valid construction plant competence scheme card for the Equipment they are required to operate. Equipment shall only be maintained (including changing cutting blades) by personnel qualified to do so.

The use of semi-automated devices for attaching excavator buckets (quick hitch buckets) is prohibited on the Project.

The *Contractor* shall ensure that all Equipment is recorded in an Asset Register (see Part 14 Management and Administration of the Works of Volume 2B of the Works Information) and tested/inspected and examined in accordance with relevant legal and manufacturers requirements.

19.7.18 Inspection & Testing

As part of the workplace health and safety requirements the *Contractor* shall have in place an effective inspection and testing programme for construction plant and Equipment including but not limited to the following:

- electrical tools and appliances;
- Equipment;
- lifting and rigging equipment; and
- office Equipment.

19.7.19 Not Used

19.8 Site Mobilisation and Starting Works

19.8.1 Site Mobilisation

The *Contractor* is not permitted to commence site mobilisation to the Site and/or the Working Areas until formal notification is obtained from the *Project Manager*. This notification will record that the *Contractor* has fulfilled each of the requirements set-out in appendix 19H, where applicable to the type and scope of the *works*.

The items outlined in Appendix 19H constitute the minimum requirements to be fulfilled by the *Contractor*. The *Contractor* shall be aware that, in addition to the items listed in Appendix 19H, other contractual and applicable statutory requirements may need to be fulfilled before the mobilisation is formally approved. Such approval shall not relieve the *Contractor* from his duties specified elsewhere in the contract

Mobilisation works include but are not limited to:

- installation of hoarding, fencing and gates around the Working Areas;
- installation of required corporate, security and statutory signage;
- setting-up the site office accommodation, temporary buildings, welfare facilities and associated utilities services and furnishing;
- setting-up the storage facilities, on-site testing facilities, plants and workshops;
- setting-up the first aid and medical facilities;
- establishing site specific health and safety arrangements and controls in and around the Working Area;
- establishing site specific security and traffic controls and arrangement in and around the Working Area;
- setting survey control points and performing topographical, buried services and existing facilities surveys in and around the Working Areas; and
- transport of Equipment, construction plant, tools and Plant and Materials to the Working Areas.

For the avoidance of doubt, the receipt of notification permitting the *Contractor* to mobilise shall allow the *Contractor* to undertake those activities in connection with mobilisation only. No construction work shall start until the *Project Manager* has notified in accordance with 19.8.2 below.

19.8.2 Commencement of Construction Works

The *Contractor* is not permitted to commence construction works (other than mobilisation works) until formal notification is received from the *Project Manager*.

A pre-commencement readiness assessment shall be undertaken by the *Project Manager* to ensure that the *Contractor* has in place the documentation, consents, processes and controls to allow the *works* to proceed.

The *Contractor* shall supply all necessary information and/or access to information that the *Project Manager* requires to support this process.

The requirements shown in Appendix 19J below constitute the minimum requirements to be fulfilled by the *Contractor* prior to commencing construction works and shall not relieve the *Contractor* from his duties specified elsewhere in the contract. The *Contractor* shall be aware that, in addition to the items listed in appendix 19J, other contract and applicable statutory requirements may need to be fulfilled before the start of work is formally approved.

19.9 Monitoring, Inspection and Surveillance

19.9.1 Health and Safety Inspections

The *Contractor's* supervisors and other management staff shall carry out regular health and safety inspections. The frequency of general inspections shall be at least weekly and shall take account of the nature of the work, previous results, and any other relevant factor .

19.9.2 Leadership Tours

Senior managers from the *Employer's* and *Project Manager's* organisations shall complete leadership tours in accordance with and in support of the Target Zero programme. The frequency of leadership tours shall be accepted by the *Project Manager* but shall be at least monthly. The *Contractor's* senior managers and those of his Subcontractors shall contribute actively in these leadership tours as part of the joint commitment to deliver health and safety excellence across the Project.

The basis of any leadership tour shall be to focus on the four broad categories listed below and to provide an opportunity for employees and the subcontractors and suppliers of any tier to raise and share any health or safety successes and concerns and to seek assurance that health and safety systems across the Project are understood and followed:

- Target Zero programme activity;
- worksite conditions and paperwork systems;
- observed work practices; and
- discussion with site operatives.

19.10 Assurance, Audit and Review

19.10.1 General

The emphasis throughout the provision of the *works* shall be on the *Contractor* conducting their own monitoring, auditing and investigations and providing assurance that the information so generated is valid and verifiable. The *Contractor* shall also co-operate fully with any monitoring, audits or specific investigations carried out by the *Employer* and/or the *Project Manager* and associated representative bodies. The *Contractor* shall conduct health and safety assurance activities in order to maintain and improve health and safety performance across the Project.

19.10.2 Assurance

The *Contractor* shall establish suitable arrangements to monitor compliance with health and safety requirements, the results of these monitoring arrangements shall be communicated to the *Project Manager* and action taken to address any issues or concerns.

The *Project Manager* and/or *Employer* may actively engage in joint inspections managed by the *Contractor* for the purpose of monitoring compliance

The *Contractor* shall maintain suitable and sufficient records to identify safety trends, performance reports and associated industry benchmarks. The *Contractor* shall upload and provide assurance via the IMS (RIVO) system and ensure the *Contractor's* data is reported and closed out in a timely manner. The *Contractor* shall also be assigned responsibilities for close out of actions as a primary function of the system.

19.10.3 Auditing of Health and Safety Management

The *Project Manager* may carry out audits of the *Contractor's* health and safety management systems in operation on this contract.

The level of audits conducted on the *Contractor*, including any required ahead of the start of work, as part of the competence review process, shall be decided by the *Project Manager*. Any such audits shall include site verification that management systems are being applied.

Findings considered by the *Project Manager* to represent serious safety risks shall be referred immediately to the *Contractor's* senior managers for immediate action.

19.10.4 Corrective Action Reports (CAR's)

Any failures to meet health or safety requirements identified through audits and inspection shall result in the generation of a Corrective Action Report by the *Project Manager*. The *Contractor* shall ensure a process is in place to track/trend and close out identified actions and report on same during periodical reports.

The *Contractor* shall ensure tracking of action close out are in place and recorded periodically throughout the Project. The *Contractor* shall use the IMS (RIVO) system for reporting non-conformances and ensure the *Contractor's* data is reported and closed out in a timely manner.

19.11 Best Practice

During the lifecycle of the Project, it is anticipated that a number of industry best practices shall be developed and rolled out across the Project. Where identified the *Contractor* shall adopt such industry best practice to improve health, safety and environmental performance. Such industry best practice may comprise HSE Standards and, behavioural techniques and processes along with general site safety 'best practices' adopted from specific *Contractor's* who are successfully delivering the *Employer's* Target Zero programme.

The *Contractor* shall attend health and safety forums and events as part of the *Employer's* Target Zero programme.

19.12 Appendices

Appendix 19A Transport for London and Crossrail Health Safety and Environmental Policies

Appendix 19B Health, Safety and Environmental Agreement

Appendix 19C The Crossrail Golden Rules

Appendix 19D CSCS Amalgamated and Affiliated Schemes

Appendix 19E Method Statement and Risk Assessment Standard Requirements

Appendix 19F Not Used

Appendix 19G Permit to Demolish Form

Appendix 19H Site Mobilisation Requirements

Appendix 19J Commencement of Works Requirements

Appendix 19K PPE Branding Requirements

Appendix 19L Drugs and Alcohol Policy

Appendix 19M Not Used

Appendix 19N Designing for Health & Safety Procedure

Appendix 19P Healthy by Design

Part 20 – Quality Management

20.1 Not Used

20.2 General Requirements

The *Contractor* shall have a Quality Management System in place which meets the requirements of ISO 9001 and demonstrates compliance with the Works Information and takes full account of the Site Information. Third party registration of assessed capability (i.e. approval to ISO 9001) is not considered to be demonstration that the specified Quality Management System requirements of the contract have been met.

The Quality Management System is to be capable of demonstrating by *Contractor* self certification that all the requirements of the contract and all relevant standards, regulations etc are being met. Self certification is the process whereby the *Contractor* can demonstrate that all the requirements of the contract have been fulfilled.

The *Contractor* shall ensure that subcontractors and suppliers of any tier also supply a quality presence with adequate resources and appropriate authority to ensure the quality of work on this Contract.

The *Contractor* shall not commence design, procurement, construction, installation, commissioning or maintenance activity until a suitable and relevant Contract Quality Plan has been accepted by the *Project Manager*.

The *Employer*, the *Project Manager*, the *Supervisor* and any third parties authorised by the *Project Manager*, including LUL, NR, DLR, TfL, statutory authorities and statutory undertakers, shall have the right to conduct audits, inspections and tests of any part of the *works* that are being executed in connection with their assets by the *Contractor* and to observe the execution of these activities.

The *Contractor* shall manage the inspection and testing necessary to demonstrate that all specified requirements in the Works Information have been met by the dates shown on the Accepted Programme. All Defects are to be resolved before issue of the Defects Certificate and final acceptance of the *works* or any *section* of the *works* by the *Project Manager*.

In addition to the verification activities identified on ITPs, the *Contractor* shall perform quality-related site surveillance activities including in-process monitoring against method statements in accordance with a planned schedule. The observations made shall be recorded, followed up, and tracked to closure; this may include the raising of improvement initiatives, lessons learned, and NCRs.

The *Contractor* shall attend regular quality focus meetings with the *Project Manager*, the *Supervisor* and the *Employer*, at which a site visit will be followed by a review of quality performance and issues, including the bullet list below.

The *Contractor* shall contribute to and participate in the identification, discussion and implementation of lessons learned initiatives agreed with the *Project Manager*.

The *Contractor* shall make available for audit all records necessary to demonstrate that the *works* have been executed in accordance with the contract. They also provide the *Project Manager* with documents that demonstrate that the *works* are progressing in accordance with specified requirements. These documents are to be provided in a timely manner as the work progresses.

The *Contractor* shall provide periodic progress reporting of quality management activities in accordance with Part 14 Management and Administration of the Works in Volume 2B of the Works Information including the following:

- management system status;
- audit progress results, CARs, and outstanding issues;
- status of RFI's and non-conformities and summary of actions taken to close out;
- progress on certification and records;
- quality issues identified and / or anticipated;
- improvement activities; and
- performance against the agreed key performance indicators.

Quality issues shall also be identified in the *Contractor's* weekly reports which are provided to the *Project Manager*.

The *Contractor's* Quality Management System shall provide procedures for witnessing the manufacturing, construction, installation, testing and commissioning of the works.

The *Contractor* shall develop, with the *Project Manager*, quality improvement initiatives.

20.3 Not Used

20.4 Contract Quality Plan

Within 4 weeks of the *starting date*, the *Contractor* shall produce a Contract Quality Plan (CQP) and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Contract Quality Plan the *Project Manager* replies within 4 weeks of the date of submission. The *Contractor* shall agree with the *Project Manager* the submittal timings of the CQP to interface with the requirements of the Accepted Programme. Any further revisions, submissions and responses shall be made within the *period for reply*.

The *Contractor* shall not start any activity on any part of the *works* for which the Contract Quality Plan, applicable QSPs or ITPs, are not accepted by the *Project Manager*. Where these documents together adequately address ongoing and imminent works but not the entire scope of the *works*, the *Project Manager* may give limited acceptance to the *Contractor's* submission in order to allow limited activities to proceed.

The Contract Quality Plan shall include the controls to be applied by the *Contractor* and subcontractors and suppliers of any tier, both directly and by identifying the Quality Management System documentation that subcontractors and suppliers of any tier are required to produce. The *Contractor* shall ensure that subcontractors and suppliers of any tier agree to and implement the applicable controls specified in the Contract Quality Plan and the identified Quality Management System documentation.

The Contract Quality Plan shall be developed in accordance with the guidelines set out in ISO 10005:2005 and as appropriate:

- cover the relevant phases of the contract (correlation and condition survey, design, procurement, manufacture, construction, installation, testing, commissioning and maintenance);
- comply with BS EN ISO 9001;
- contain a policy confirming a commitment to the management of quality and identify quality objectives;
- describe how performance against quality policies and objectives will be measured and reported;
- incorporate or reference the full list of applicable QSPs;
- include or reference roles and responsibilities within the organisation, including those for all quality personnel;
- identify responsibility for implementation of arrangements for inspection & testing, as well as who is responsible for certifying that compliance with requirements has been achieved;
- describe the interrelationship between partners' quality systems where the *Contractor* is a joint venture or consortium and identify the partner responsible for assembling and retaining all *Contractor* records for the contract;
- describe the relationships and activities of the *Contractor* and his subcontractors and suppliers including organograms;
- specify the requirements of the Quality Management System to be operated by the *Contractor's* subcontractors and suppliers;

- indicate the inter-relationship of the Contract Quality Plan with other associated documentation of the *Contractor*;
- include criteria and methods to monitor and measure the effectiveness and efficiency of processes required for managing quality and the competent resource needed to undertake these activities;
- incorporate a monitoring system for procurement, maintenance and condition of Equipment, Plant and Materials to ensure that contract objectives can be fulfilled;
- include a Package Breakdown Structure identifying the proposed number and structure of certification packages, programme for submission of these packages, and the dedicated resource to be assigned to this activity;
- identify quality-related key performance indicators, including those related to the measurement against quality objectives and others based on inspection attendances and the results of surveillances;
- identify continual improvement activities;
- allow for external second and third party audits to be carried out as required by the *Project Manager* and Others as described in 20.2;
- incorporate comprehensive quality system audit procedures including a quality audit schedule and the process for the preparation of audit reports;
- incorporate reference to the use of PTR, the Snagging and Outstanding Works (Punchworks) database (described in 20.8)
- describe the statistical process techniques to prevent the occurrence of Non-conformities;
- provide for regular management reviews of the contract Quality Management System and subsequent updating as necessary;
- identify those Subcontractor and supplier documents that are to be submitted for acceptance to the *Project Manager*;
- include *Contractor's* and Subcontractors' design control systems/procedures; and
- include contract Completion procedures which shall provide for review and verification of records by the *Contractor's* Quality Manager.

The Contract Quality Plan shall be supported by comprehensive QSPs. . The *Project Manager* shall agree with the *Contractor* which QSPs require the *Project Manager's* acceptance. The primary activities addressed by QSPs and to be implemented by the *Contractor* are to include:

- skills and required competency levels for all personnel performing quality related activities;
- preparation of QSPs for design (including temporary works), procurement, manufacture, construction, installation and testing along with all management system processes;
- design control including verification, validation, certification, approval and acceptance by Others (see Section 7 of Works Information);
- preparation of material requisitions including manufacturer certification requirements;
- approval of purchase orders in accordance with accepted specifications;
- preparation, review, approval and monitoring of ITPs;
- control of documents & data;
- control and calibration of measuring and test equipment;
- scheduling of necessary testing;
- interim inspection of work including temporary works;
- monitoring against method statements;
- monitoring the activities of subcontractors and suppliers of any tier to ensure their compliance with the contract;
- review of Subcontractors' and material suppliers' quality verification documentation;
- administration of Non-conformities and reporting to the *Project Manager*, including use of the PTR system;
- certification control and co-ordination;
- quality verification and surveillance inspection of the partially completed and completed works and collation of quality verification records;
- verification of Equipment, Plant and Materials and system compliance through conducting inspection, testing and commissioning;
- administration of design, procurement, manufacture, construction, installation, test and functional non-conformities and concessions and reporting of them to the *Project Manager*, and
- production of four-weekly reports of quality data as indicated in 20.2 above.

The *Contractor* shall complete the *works* in accordance with the applicable Contract Quality Plan and QSPs.

Contract Quality Plans are supported by applicable procedures (including QSPs), Inspection & Test Plans, Method Statements and Crossrail Standards. The *Contractor* is to minimise the duplication of information in the various quality system documents.

20.5 Quality Audits

The *Contractor* shall submit with his Contract Quality Plan a quality audit schedule of internal and Subcontractor and supplier audits that are conducted by his personnel. This schedule shall be planned using a risk based approach and ensure that all key activities are audited at a time and frequency appropriate to the significance of the activity under review. The schedule shall be a twelve-month rolling schedule and shall be reviewed every four weeks with the *Project Manager* to reflect all relevant aspects of the contract. Following any amendments the revised quality audit schedule shall be submitted for acceptance by the *Project Manager*.

The *Contractor* shall allow the *Employer*, the *Project Manager*, and third parties authorised by the *Project Manager* to observe/participate in these audits and to conduct additional independent audits, as they consider appropriate to provide assurance that the *works* are being conducted in accordance with contractual requirements. The *Contractor* provides the facilities and access necessary for these audits to be carried out effectively.

The *Contractor* shall place similar requirements on his subcontractors and suppliers and use his reasonable endeavours to ensure that access is provided to audits carried out by subcontractors and suppliers of any tier.

All audits performed by the *Contractor* shall be carried out in accordance with the guidelines of BS EN ISO19011 and all audit reports are, unless otherwise agreed, to be submitted to the *Project Manager* for acceptance.

The *Contractor* shall record, track and manage the timely close out of any Non-conformities found by the audit, by implementing the necessary corrective action to eliminate the detected non-conformity and its cause. Audit findings shall be analysed and communicated to the interested parties to enable system and process improvements and where appropriate, management actions.

The quality audit schedule shall be supplemented by *Contractor* surveillance activities which verify compliance with the Works Information as described in 20.2 above.

20.6 Quality Management Resources

20.6.1 General

The *Contractor* shall provide its own and its subcontractors' and suppliers' organisation charts. The charts show the reporting structure of the management and

supervisory personnel on the contract and the reporting lines for both quality assurance and quality control/inspection personnel. The charts shall identify personnel responsible for key inspection activities.

The *Contractor* shall demonstrate that adequate resources are provided to fulfil the requirements for quality management, inspection & testing and self certification.

The *Contractor* shall provide appropriate training to all personnel in the operation of the Quality Management System and maintain training records.

20.6.2 Quality Manager

The *Contractor* shall appoint a Quality Manager..

The Quality Manager shall be independent of the design and construction functions, and have an independent link to senior director level. The Quality Manager shall be full-time for the duration of the contract, dedicated to quality matters on this contract, and shall be provided with adequate resources and authority to enable the quality of work on the contract to be managed effectively.

The Quality Manager shall:

- develop and implement a Contract Quality Plan as detailed in 20.4 above;
- develop and provide quality training for all personnel to include induction and training for staff with specific quality responsibilities;
- manage all quality personnel;
- approve the quality elements of the *Contractor's* method statements;
- ensure compliance with legal and contractual requirements;
- provide advice and instruction to construction teams to deal rapidly and effectively with quality Non-conformities and complaints;
- analyse individual Non-conformities and complaints to identify trends, root causes and the corrective and preventive actions needed;
- ensure the provision and review of ITPs;
- undertake audits of the *Contractor* and Subcontractors including compliance with legal and contractual requirements;
- produce information for management review with top management and attend the management review meeting to ensure that the quality management system remains suitable, adequate and effective; and

The Quality Manager shall have the following key competencies:

- appropriate experience of quality management and the delivery functions of the contractor/supplier under self certification contracts;
- good knowledge and practical experience of developing, implementing and improving quality management systems;
- be a member of the Chartered Quality Institute (or an equivalent recognised quality body) or an appropriate engineering institute; and
- be a competent auditor or have access to competent auditors

20.7 Materials and Construction

The *Contractor* shall develop a Materials Proposal Schedule (MPS) listing all proposed permanent works materials and products and indicating any variances from the specified materials. The MPS shall identify:

- architectural & non-architectural items;
- samples/ mock-ups/ prototypes/ test panels/benchmarks required;
- PTR-RFI reference numbers;
- material approvers (*Contractor* /sub contractor organisations/persons, including applicable BREEM specialists); and
- target dates (approval, delivery, over dues)

The *Contractor* shall regularly submit the Material Proposal Schedule and a matrix of approvers for all materials and products, commencing within 6 weeks of the *starting date*.

The *Contractor* shall ensure that the Project's quality certification requirements are established in the preparation of material requisitions and orders for manufactured goods and materials.

Unless otherwise accepted by the *Project Manager*, Plant and Materials forming part of the works or temporary works incorporated into the *works* shall be procured from sources that hold appropriate certification from a United Kingdom Accreditation Service (UKAS) accredited certification body (or one that has mutual recognition with UKAS). The existence of UKAS or similar acceptable accreditation does not relieve the *Contractor* from ensuring the quality of the products.

The *Contractor* shall make available certification to demonstrate that Plant and Materials used comply with the relevant legal requirements and standards. Material quality and traceability requirements for *Employer* designed parts of the *works* are described on the drawings and in the materials and workmanship specifications in Part 2 of Volume 2C of the Works Information. For *Contractor* designed parts of the *works* the material quality and traceability requirements shall be indicated on

applicable drawings or materials and workmanship specifications or by reference to appropriate codes of practice.

Verification of the quality and material traceability of each element of the *works* shall be the responsibility of the *Contractor* and shall be achieved through checks, tests, inspections, audits and reviews, planned and implemented in accordance with the Contract Quality Plan and ITPs developed by the *Contractor*.

Unless otherwise accepted by the *Project Manager*, the *Contractor* and his Subcontractors and suppliers shall use the Project proforma for inspection & test records and construction certificates (see Part 13 Assurance, Records and Certification to be Provided by the *Contractor* of Volume 2B of the Works Information).

The *Contractor* shall provide representative samples of proposed manufactured items, mock-ups/ prototypes/benchmarks of proposed fabricated or constructed items, and test panels of standard finishes, including concrete, to be achieved during construction as required by the drawings and materials and workmanship specifications in Part 2 of Volume 2C of the Works Information and applicable drawings or materials and workmanship specifications produced by the *Contractor* as part of his design obligations. Each sample shall be offered for inspection and acceptance by the *Supervisor* prior to construction of the parts of the *works* represented. The sample shall subsequently be protected and retained by the *Contractor* and made available as an inspection reference until Completion.

The *Contractor* shall maintain for *Project Manager's* acceptance, a schedule of all samples, mock-ups, prototypes, test panels and benchmarks within the Material Proposal Schedule which identifies for each:

- the planned date at which each sample will be made available for inspection by the *Supervisor*;
- the planned date at which the *Supervisor's* acceptance will be needed;
- the part of the Works Information that requested it;
- the part(s) of the *works* that it represents;
- a unique reference number;
- the secure location (accepted by the *Project Manager*) where the item is stored or located; and
- the acceptance status of the sample by the *Contractor* and by the *Supervisor*.

The preliminary schedule shall be submitted for the *Project Manager's* acceptance within 6 weeks of the *starting date*, and shall subsequently be regularly updated and resubmitted to incorporate changes and updates.

20.8 Inspection and Testing

The *Contractor* and his subcontractors and suppliers of any tier engaged in supplying, manufacturing, construction, installation, commissioning and testing or any other service connected with the *works*, shall maintain ITPs appropriate for the services they provide that are accepted by the *Supervisor*. These accepted ITPs shall stipulate the necessary level and frequency of tests and inspections for each aspect of the works and also stipulate:

- item(s) being inspected and tested;
- the inspection and test activity;
- acceptance criteria;
- involvement of various parties including hold and witness points;
- controlling specifications; and
- certification/documentation/records to be generated in support of the inspection and test activities.

Activities listed in the ITP shall include pre-construction activities such as material approvals and completion activities such as close out of any NCRs arising. The *Contractor* shall complete the details to be stipulated in the ITPs including acceptance criteria. As a minimum the acceptance criteria shall comply with the requirements specified in the Works Information, this shall include the provision of samples/mock-up/prototypes (including test panels and benchmarking of standard finishes for agreement with the *Supervisor* where identified). Where not specified the *Contractor* shall propose acceptance criteria for the *Supervisor's* acceptance, including the method and frequency of inspection and testing.

The *Contractor* shall submit the ITP to the *Supervisor* 4 weeks prior to the start of the relevant works using the proforma included as Appendix 20C unless agreed otherwise by the *Project Manager*. The *Contractor* shall not start the relevant works until the *Supervisor* has accepted the ITP. The *Contractor* shall maintain a schedule of ITP submissions with a record of the status of review and acceptance. Any further revisions, submissions and responses shall be made within the *period for reply*.

ITPs refer to those procedures, method statements and other documents such as national standards, codes of practice and legislation, which are to be used to control in-process and completed works.

Records and other deliverables generated as part of the inspection and test process shall be identified within the ITPs. The ITPs shall also make clear who is responsible for implementing the planned arrangements, as well as who is responsible for certifying that compliance with requirements has been achieved in practice.

Whilst 'self certification' represents a fundamental principle that shall be used, the *Supervisor* shall identify upon receipt and acceptance of the *Contractor's* ITPs those activities, which are required to be checked and/or witnessed by the *Supervisor*,

Employer and/or third parties. Mandatory interventions shall be defined as ‘Hold Points’, other interventions may include activities such as ‘Witness Points’ and ‘Review Points’. The *Contractor* shall ensure a minimum of 7 days notice is provided for Hold Points in the United Kingdom and 14 days notice for those outside the United Kingdom.

The *Contractor* shall implement QSPs to verify conformance with the Works Information. The *Contractor's* verification is accomplished by examinations, tests, measurement and inspection and by verifying records including those of his Subcontractors and suppliers. The *Contractor's* verification procedures shall be developed using applicable testing and inspection methods along with acceptance criteria stipulated by the drawings and materials and workmanship specifications in in Part 2 of Volume 2C of the Works Information and applicable drawings or materials and workmanship specifications produced by the *Contractor* as part of his design obligations.

The *Contractor* shall ensure that staff nominated for undertaking sampling, inspection and testing activities are appropriately trained and competent to carry out the particular activities to which they have been assigned. The *Contractor* shall maintain records of training and competence and make such records available to the *Supervisor* for inspection upon request.

The *Contractor* shall conduct inspections and tests in accordance with his detailed quality plans and ITPs. Key inspection activities shall be agreed with the *Supervisor* prior to construction, which shall include activities of structural or operational, significance, and inspections which are of a subjective nature or release work that is to be covered up. The *Contractor* shall record the completion of inspections and tests and identify records of the results.

Where a Defect in a works item is noted that cannot be put back in compliance within the same shift the *Contractor* shall raise a NCR. Where a specified work activity has not been carried out in accordance with agreed procedural requirements, a NCR is raised. Unless otherwise accepted by the *Supervisor*, the *Contractor* shall enter each NCR, including sub-contractor NCRs, in the PTR system. Appendix 20A of this Works Information describes the application details for NCRs.

Nominated *Contractor* personnel, accepted by the *Supervisor*, shall produce a schedule of inspections to identify Defects and shall raise snagging lists or outstanding works lists at appropriate inspection and acceptance stages to record work that has not been completed correctly or which is outstanding. Defects identified during the inspection and included in these lists shall also require NCRs to be raised. Where testing and commissioning activities are to follow construction, access shall be provided to testing and commissioning personnel and their snagging/outstanding works items shall be included in these lists. Any items remaining open at Completion and any new Defects identified after Completion shall be transferred to a list of Defects for clearance. All snagging, and outstanding works items shall be entered by the *Contractor* into Punchworks or an alternative database provided by the *Project Manager*, and tracked to closure. Appendix 20A of this Works Information describes the application details for such items.

RFIs shall be used within the PTR system by the *Contractor* to formally request from the *Project Manager* information, clarification or agreement to a proposed action. Appendix 20A of this Works Information describes the application details for RFIs.

Each NCR requiring a concession or design change shall be referred to the *Project Manager* by the *Contractor* for appropriate resolution. Any agreed remedial action shall be completed prior to the commencement of any further activities that may render the non-conforming item inaccessible, difficult to repair or increase the cost of the repair.

All on-site and off-site testing shall be carried out by laboratories accredited by UKAS or similar, acceptable national body or by persons accredited to a similar standard. The samples shall be taken by staff appointed by the laboratory. The requirement for UKAS accreditation may be waived for the testing of systems and their components, subject to an alternative testing proposal by the *Contractor* and the acceptance of the proposal by the *Project Manager*.

Testing and sampling methodologies shall be in accordance with the standards contained in the Materials and Workmanship Specifications in Part 2 of Volume 2C of the Works Information, unless otherwise specified in Part 2A of the Works Information or written agreement from the Project Manager, to a change in testing and sampling methodologies is provided .

The *Contractor* shall maintain a schedule of all inspection, measuring and test Equipment used for the *works* that includes records of the calibration of such Equipment to nationally recognised standards.

Notification of Inspections and Tests

Inspections and tests during construction shall be notified by the *Contractor* to the *Supervisor* utilising the Inspection Request Form (IRF) identified in Appendix 20D.

Where the *Contractor* requires the following:

- Off-site inspections and the like
- The involvement of Others
- Specialist/functional involvement in
 - Planned surveillance
 - Benchmarking
 - “first – offs” and trial builds
 - Mock-ups
 - Samples

The *Contractor* shall provide to the *Supervisor* a weekly schedule of inspections and tests to be undertaken (to include planned and achieved).

20.9 Self Certification

The *Contractor* shall be responsible for demonstrating that the *works* have been completed in accordance with the requirements of the Works Information and shall produce records that provide clear evidence of conformance. This includes the implementation of surveillance and other effective controls to ensure that the checking, review, inspection and testing of the *works* are completed and satisfactory.

The *Contractor* shall produce records of self certification activities including demonstration that the supporting documents and “as-built” details have been satisfactorily completed and that the *Project Manager* has accepted the *Contractor’s* plans to correct notified Defects Part 13 Assurance, Records and Certification to be Provided by the *Contractor* of Volume 2B of the Works Information details the records that the *Contractor* provides to the *Project Manager* as the *works* progress.

The *Project Manager* and *Supervisor* monitor the effectiveness of the *Contractor’s* self certification system through:

- surveillance;
- witnessing appropriate key activities;
- review of certification and records;
- monitoring and participation in the *Contractor’s* audit schedule; and
- independent auditing.

If the *Contractor* fails to demonstrate that specified requirements are being met, the *Project Manager* may notify the *Contractor* that its Quality Management System is defective. A defective Quality Management System is demonstrated by any of the following:

- Defects and/or Non-conformities not being identified by the *Contractor* in a timely manner;
- Defects and/or Non-conformities not being resolved in a timely manner, including failure to meet criteria for clearance identified in the Works Information;
- failure to prevent recurring Non-conformities;
- consistent failure to provide required certification and records as the *works* are executed;

- audits by the *Contractor*, the *Project Manager* or any independent party identifying significant inadequacies in the Quality Management System; or
- Identified inadequacies in the Quality Management System not being resolved in a timely manner.

If following notification by the *Project Manager* of an ineffective Quality Management System, the *Contractor* fails to correct the Quality Management System within one week of receipt by the *Contractor* of the notification, the *Project Manager* may either implement his own quality management regime on the works to correct the quality system or instruct the *Contractor* to stop or not to start any further works until inadequacies are fully addressed. In such circumstances the *Employer* shall recover any abortive costs incurred from the *Contractor*.

20.10 Not Used

20.11 Appendices

Appendix 20A Application Matrix for Agreed Defects List, Snagging Lists, RFIs, NCR's and CAR's

Appendix 20B Tracking & Control of Deficiencies at the Time of Completion

Appendix 20C Inspection and Test Plan proforma

Appendix 20D Inspection Request Form

Part 21 – Environmental Management

21.1 Introduction

21.1.1 Not Used

21.1.2 Environmental Impacts and Mitigation

The *Contractor* shall seek to limit adverse impacts of the *works* on the environment including the local community and on the operations of Network Rail, London Underground and other rail companies, and mitigate any adverse impact to the minimum practicable. The *Contractor* shall co-operate with Others including non-Crossrail projects to reduce combined impacts.

The *Contractor* shall bring to the attention of the *Project Manager* any mitigation measures and opportunities for environmental enhancement over and above those specified in the Works Information that could reduce any adverse environmental impacts.

21.2 Environmental Staffing and Resources

21.2.1 General

The *Contractor* shall demonstrate that all employees and subcontractors and suppliers of any tier, have an appropriate awareness and working knowledge of environmental legislation, environmental standards and guidance relevant to the construction activities in which they are engaged.

The *Contractor* shall designate a named individual who shall be the primary environmental contact point with the statutory bodies. The *Contractor* may designate a different named individual for each different statutory agency. The *Contractor* shall inform the *Project Manager* and the relevant statutory agency who this individual is and provide contact details. The *Contractor* shall only contact the named individual(s) at these statutory bodies, as provided by the *Project Manager*.

21.2.2 Environmental Personnel

The *Contractor* shall appoint an Environmental Manager and other environmental specialists where required by the Works Information or where necessary to Provide the Works.

The *Contractor* shall submit the curriculum vitae of all proposed environmental personnel to the *Project Manager* for acceptance. Environmental personnel shall not be appointed until the *Project Manager's* acceptance has been obtained, at any time during the duration of the contract.

21.2.3 Environmental Manager

The Environmental Manager shall:

- develop and implement an Environmental Management System (see 21.4 below) certified by a UKAS (or equivalent) accredited certification body to ISO14001,;
- develop and provide environmental training for all personnel to include induction, tool box talks and specific training for personnel with specific environmental responsibilities;
- manage all environmental personnel including all environmental specialists;
- co-ordinate between the environmental specialists and the construction teams;
- approve the environmental parts of the *Contractor's* method statements;
- co-ordinate with other contractors regarding cumulative impacts on worksites where there are multiple contractors;
- ensure compliance with environmental legal and contractual requirements;
- input to the consents programme managed by the *Contractor's* Consents Co-ordinator (as specified in Part 3 Planning, Environmental and Traffic Consents of Volume 2B of the Works Information) and prepare environmental consent applications;
- provide advice and instruction to construction teams to deal rapidly and effectively with environmental incidents and complaints;
- liaise with the *Contractor's* procurement personnel to ensure that procurement incorporates sustainability (as specified in this part of the Works Information);
- ensure an appropriate and competent individual is nominated to liaise with external parties, such as the local authorities, the Environment Agency, Natural England and English Heritage, as necessary and in conjunction with the *Project Manager*,
- analyse individual environmental incidents and complaints to identify root causes, corrective and preventative actions needed;
- analyse environmental incidents and complaints to identify trends and strategic actions;
- manage environmental monitoring included in this part of the Works Information or as required by consents, including analysis and interpretation of monitoring results and actions;

- undertake audits of the *Contractor* and subcontractors against legal and contractual requirements provided that (s)he is independent of the activity being audited and has the competencies, experience and qualifications for Environmental Auditor given below;
- produce report/ information for the environmental part of the progress report and attend the progress meeting to ensure that the Environmental Management System remains suitable, adequate and effective; and
- be the main environmental contact with the *Project Manager*.

The Environmental Manager shall have the following competencies, experience and qualifications:

- appropriate experience of environmental management on construction projects including site experience;
- good knowledge and practical experience of legal requirements and how to comply with them including archaeology, air quality, noise and vibration, surface and groundwater, contaminated land, waste, ecology and built heritage;
- good knowledge and practical experience of developing, implementing and improving Environmental Management Systems compliant with ISO14001;
- experience of liaison with stakeholders including statutory bodies such as local authorities, the Environment Agency, Natural England and English Heritage;
- experience of obtaining and complying with environmental consents; and
- be an associate member or full member of the Institute of Environmental Management and Assessment (or equivalent recognised competent body).

21.2.4 Noise and Vibration Specialist

The *Contractor* shall appoint a Noise and Vibration Specialist. The Noise and Vibration Specialist shall:

- advise and instruct construction teams on how to meet legal and contractual (see 21.8 below) noise and vibration requirements, including Section 61 consents and the Crossrail Noise and Vibration Mitigation Scheme;
- develop and implement the noise and vibration section of the Environmental Plan for the *works* (see 21.8.2 below);
- work closely with construction teams, particularly the construction planning team;
- undertake all assessments and predictions for Section 61 consent applications and produce the consent application;

- undertake baseline noise and vibration surveys (where required);
- complete noise and vibration assessments for the *Contractor's* temporary works and Equipment to determine their design and location and any necessary mitigation works required to maintain noise and vibration levels below the trigger levels;
- for listed buildings, liaise with the *Contractor's* Heritage Specialist regarding potential impacts on and mitigation measures for listed buildings;
- plan and implement the *Contractor's* scheme for noise and vibration monitoring;
- undertake all noise and vibration monitoring activities – no other personnel shall undertake noise and vibration monitoring activities;
- check all results for compliance with requirements and advise construction teams on action required and follow-up;
- provide reports on progress and any problems with noise and vibration issues;
- liaise with local authorities as necessary and in conjunction with the *Project Manager*, including providing them with Section 61 consent applications on time and monitoring results in any timescales agreed with them; and
- work with the *Project Manager* and the *Employer* to manage and control cumulative noise and vibration impacts where there is more than one contractor working concurrently in the Working Areas

The Noise and Vibration Specialist shall have the following competencies, experience and qualifications:

- appropriate experience of dealing with noise and vibration on construction projects;
- good knowledge and practical experience of legal requirements and how to comply with them;
- experience of liaison with stakeholders including statutory bodies such as local authorities;
- experience of obtaining and complying with Section 61 consents; and
- be an Associate or Full Member of the Institute of Acoustics (or equivalent competent body).

21.2.5 Waste Manager

The *Contractor* shall appoint a Waste Manager. The Waste Manager shall:

- advise and instruct construction teams on how to meet legal and contractual (see 21.9 below) waste management requirements;
- develop and implement the Site Waste Management Plan (see 21.9.2 below);
- identify and implement ways to reduce, reuse and recycle waste with a preference given to reusing and recycling of waste within the Project;
- classify waste categories prior to removal from site;
- work with the Environment Manager to provide training and information on waste;
- provide reports on progress and any problems with waste issues;
- work closely with construction teams; and
- liaise with external parties, such as the Environment Agency, as necessary and in conjunction with the *Project Manager*.

The Waste Manager shall have the following competencies, experience and qualifications:

- appropriate experience of waste management on construction projects, including site experience;
- good knowledge and practical experience of legal requirements and how to comply with them, including waste transfer notes, hazardous waste requirements, Waste Management Licensing / Environmental Permits and Exemptions;
- good knowledge and practical experience of developing and implementing Site Waste Management Plans;
- experience of liaison with stakeholders including statutory bodies such as the Environment Agency;
- experience of complying with waste management licenses/ environmental permits and obtaining exemptions to waste management licenses/ environmental permits; and
- have successfully completed at least 2 days formal relevant training in waste management e.g. by the Chartered Institution of Wastes Management

21.2.6 Air Quality Specialist

The *Contractor* shall appoint an Air Quality Specialist. The Air Quality Specialist shall:

- advise and instruct construction teams on how to meet legal and contractual (see 21.10 below) air quality requirements;
- develop and implement an air quality section of the Environmental Plan for the *works* (see 21.10.1 below);
- plan and implement the *Contractor's* scheme for dust monitoring);
- train nominated staff to undertake basic monitoring tasks correctly e.g. downloading data and undertaking initial checking of results for compliance with requirements;
- analyse and interpret all results for compliance with requirements and advise construction teams on action required and follow-up;
- work closely with construction teams;
- liaise with local authorities as necessary and in conjunction with the *Project Manager*, including providing them with monitoring results in any timescales agreed with them; and
- work with the *Project Manager* and the *Employer* to manage and control cumulative dust impacts where there is more than one contractor working concurrently in the Working Areas.

The Air Quality Specialist shall have the following competencies, experience and qualifications:

- appropriate experience of dealing with air quality and dust, including on construction projects;
- a good knowledge and practical experience of legal requirements and the Greater London Authority's "The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance" and how to comply with them;
- experience of liaison with stakeholders including statutory bodies such as Local Authorities; and
- be an Associate or Full Member of the Institute of Air Quality Management (or equivalent competent body).

21.2.7 Land Contamination Specialist

The *Contractor* shall appoint a Land Contamination Specialist. The Land Contamination Specialist shall:

- advise and instruct construction teams on how to meet legal and contractual (see 21.13 below) contaminated land requirements;

- develop and implement the land contamination section of the Environmental Plan for the *works* (see 21.13.1 below);
- undertake and oversee site assessments, investigations and risk assessments;
- develop remedial strategies to deal with any contamination;
- advise and instruct construction teams on how to meet contaminated land requirements;
- provide reports on progress and any issues with contaminated land;
- work closely with construction teams; and
- liaise with stakeholders including local authorities and the Environment Agency as necessary and in conjunction with the *Project Manager*.

The Land Contamination Specialist shall have the following competencies, experience and qualifications:

- appropriate experience of dealing with contaminated land, including on construction projects;
- good knowledge and practical experience of legal requirements and how to comply with them;
- field experience of contaminated land ground investigations including sampling and scheduling tests;
- experience of liaison with stakeholders including statutory bodies such as local authorities and the Environment Agency; and
- full membership of a relevant professional body, such as IEMA, CIWEM, RSC, CIEH, ICE.

21.2.8 Environmental Auditor

The *Contractor* shall appoint an Environmental Auditor who shall undertake environmental audits of all parts of the *Contractor's* environmental management system including compliance with legal and contractual requirements.

The Environmental Auditor shall have the following competencies, experience and qualifications:

either be:

a registered environmental auditor with the Institute of Environmental Management and Assessment (IEMA) (or an equivalent recognised environment body) in which case the *Contractor* shall submit evidence of their auditor registration to the *Project*

Manager for acceptance at least one month prior to them commencing any audit work.

or

be an auditor from the *Contractor's* corporate organisation, in which case a curriculum vitae detailing their audit qualification and experience shall be submitted to the *Project Manager* for acceptance at least one month prior to them commencing any audit work. The auditor shall have:

- successfully completed an IEMA (or an equivalent recognised environment body) - approved environmental auditor training course;
- have appropriate experience of environmental management on construction projects including site experience;
- good knowledge and practical experience of legal requirements and how to comply with them including archaeology, air quality, noise and vibration, surface and groundwater, contaminated land, waste, ecology and built heritage; and
- good knowledge and practical experience of developing, implementing and improving Environmental Management Systems compliant with ISO14001.

21.3 Environmental Plan

The *Contractor* shall produce an Environmental Plan and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Environmental Plan the *Project Manager* will reply within 4 weeks of the date of submission. The Environmental Plan may include existing corporate procedures, plans or other documents provided that these meet legal requirements and the requirements of this contract.

The *Contractor* shall not commence work on site until the *Project Manager* has accepted the Environmental Plan.

The Environmental Plan shall include (but not necessarily be limited to):

- the management processes and procedures for complying with legal environmental requirements and all the environmental requirements of the Works Information;
- the roles and responsibilities including the job title of the nominated person responsible for each task
- a staffing plan containing a schedule identifying the names of personnel filling the roles specified in the Works Information; and whether they are employed directly, Subcontractors, full and part time personnel and the duration of their activity on this contract;

- the processes for liaison and communication with Others, including neighbouring contractors and statutory bodies, where required by this Works Information;
- a description of the *Contractor's* Environmental Management System (see 21.4 below) using the headings of BS EN ISO14001;
- the *Contractor's* environmental objectives;
- the processes for liaison and communication with subcontractors and suppliers of any tier and ensuring compliance with the requirements described in this part of the Works Information;
- the *Contractor's* programme(s) for training, site inspections, audits and consents submissions;
- selection of Equipment and the promotion of the use of green Equipment;
- noise and vibration (see 21.8.2 below);
- air quality (see 21.10.1 below);
- water (see 21.11.1 below);
- archaeology (see 21.12.2.1 below);
- heritage (see 21.12.3.1 below);
- land contamination (see 21.13.1 below);
- ecology (see 21.14.1 below);
- energy (see 21.16.1 below) and
- sustainable transport (see 21.15 below).

The *Contractor* shall ensure the plan is appropriate to all activities included in the *works*.

The *Contractor* shall train all employees, including subcontractors and suppliers of any tier, with direct or indirect responsibilities under the plan, on the contents of the plan that apply to its work.

The *Contractor* shall review and update the plan to ensure that it remains suitable, adequate and effective as the *works* progress, ensure that it reflects the current status of the *works* and:

- following any material change to the status of the *works* or site that has an impact on environmental requirements;

- as instructed by the *Project Manager*, and
- at least every 6 months.

The revised plan shall be submitted to the *Project Manager* for acceptance and the *Contractor* shall keep a record of reviews of the Plan.

21.4 Environmental Management System

21.4.1 ISO 14001 Requirement

The *Contractor* shall develop and implement an Environmental Management System which shall be certified to BS EN ISO14001 by a UKAS (or equivalent) accredited certification body. The *Contractor* shall ensure that the scope of this certification covers the full scope of *works* under this contract. If any proposed or actual changes to the status of the certification occur the *Contractor* shall immediately inform the *Project Manager*.

The *Contractor's* Environmental Management System shall be described in the Environmental Plan and contract-specific procedures. The *Contractor* may use its corporate Environmental Management System and shall amend and/ or supplement its corporate Environmental Management System to ensure that it is bespoke to the Crossrail requirements set out in the Works Information. Any such amendments and/ or supplements shall be explained in the *Contractor's* Environmental Plan and/ or site-specific procedures.

Where the *Contractor* is a joint venture, the *Contractor* shall either:

Adopt one of the partners' corporate Environmental Management Systems, ensuring that it is bespoke to the Crossrail requirements as required above and shall ensure that the partners' ISO14001 certificate covers the *Contractor's* Environmental Management System. The partner's certification body shall include this contract as part of its regular audits of the partner's ISO14001 certification;

or

Create an Environmental Management System that adopts parts of any of the partners' environmental management systems and/ or develops new parts of the environmental management system, ensuring that it is bespoke to the Crossrail requirements as required; obtain a new ISO14001 certificate for the *Contractor's* Environmental Management System and ensure regular audits are undertaken by the certification body.

21.4.2 Integrated Management System

The *Contractor* may integrate any of the Environmental Management System requirements with those for Health and Safety and/ or Quality to create an Integrated Management System. Where the *Contractor* develops and implements an Integrated Management System, it shall be based on PAS99: Specification of common management system requirements as a framework for integration published by the British Standards Institute.

21.4.3 Additional Environmental Management System Requirements

In addition to obtaining and maintaining independent third party certification to ISO14001 (or equivalent), the *Contractor* shall comply with the additional Environmental Management System requirements specified in this section and document them in the Environmental Plan.

21.4.3.1 Objectives

The *Contractor* shall set objectives for himself, Subcontractors and suppliers relevant to the *works* to meet the *Employer's* environmental objectives for contractors which are to:

- reduce waste and energy use within all of the *Contractor's* site offices;
- ensure that the *Contractor*, Subcontractors and suppliers comply with the environmental requirements in the contract;
- seek ways to incorporate environmental opportunities within the design;
- seek ways to reduce the carbon footprint of the Project;
- increase awareness of environmental issues in the *Contractor's* team, subcontractors and suppliers; and
- reduce the amount of construction waste and excavated material generated and going to landfill, with maximised beneficial reuse of the materials.

The *Contractor* shall include these objectives in the Environmental Plan and submit a progress report quarterly to the *Project Manager* for acceptance (at the end of reporting periods one, four, seven and ten each year) using the report format provided by the *Project Manager*.

21.4.3.2 Environmental Data

The *Contractor* shall measure and report on the environmental data listed below. The *Contractor* shall ensure that subcontractors' on-site activities (including operation of site offices and welfare facilities), all Equipment deliveries, and any waste or recycling removed from the Site are included in this data. The *Contractor* shall input data into the *Employer's* Rivo Safeguard database and the Crossrail version of the Building Research Establishment's Smartwaste software and submit data to the *Project Manager* for each four weekly period in line with the *Project Manager's* reporting requirements for dashboard reporting. The *Contractor* shall use the data to monitor performance against objectives and targets.

Energy Consumption by type:

- Electricity consumption (normal grid mix) (kWh);
- Electricity consumption (quality CHP) (kWh);

- Electricity consumption (onsite renewables) (kWh);
- Electricity consumption (green tariff) (kWh);
- Natural gas consumption (kWh);
- Petrol consumption (litres);
- Diesel consumption (litres);
- Oil consumption (litres);
- LPG consumption (litres);
- Marine diesel consumption (litres);
- Biodiesel consumption (litres);
- Other (please specify).

Resource Consumption:

- Total amount of aggregate used (tonnes);
- Amount of recycled aggregate used (tonnes);
- Amount of timber used (tonnes);
- Amount of timber from recycled or certified sustainable sources (tonnes).

Waste Produced and proportion recycled (see section 21.9 below):

- Amount of excavated material produced (tonnes);
- Amount of excavated material recycled (tonnes);
- Amount of excavated material sent to landfill (tonnes)
- Amount of commercial and industrial waste produced (tonnes);
- Amount of commercial & industrial waste recycled (tonnes);
- Amount of commercial and industrial waste sent to landfill (tonnes)
- Amount of demolition waste produced (tonnes);
- Amount of demolition waste recycled (tonnes);
- Amount of demolition waste sent to landfill (tonnes);

- Amount of construction waste produced (tonnes);
- Amount of construction waste recycled (tonnes);
- Amount of construction waste sent to landfill (tonnes);
- Total amount of waste produced (tonnes);
- Total amount of waste recycled (tonnes);
- Total amount of waste sent to landfill (tonnes);
- Amount of waste classified as hazardous (tonnes), including proportion that results from contaminated soils;
- Amount of contaminated soil cleaned (percentage of total).

Water Consumption: total water consumed. (m³);

Number of environmental site inspections: actual and planned (not including inspections of compliance with Best Practicable Means and Section 61 consents ;

Number of environmental audits undertaken by the *Contractor*. actual and planned;

Number of non conformities raised during audits undertaken by the *Contractor* and the number overdue during period.

21.4.3.3 Programmes

The *Contractor* shall establish and maintain programmes, listing dates for training, site inspections, audits and consents (as described in this part of the Works Information).

These programmes shall be included in the *Contractor's* Environmental Plan and shall be revised and re-submitted when necessary to keep them up-to-date, when the plan is updated or when instructed by the *Project Manager*. The *Contractor* shall also include key environmental activities in the Accepted Programme.

21.4.3.4 Resources, Roles, Responsibility and Authority

The *Contractor* shall appoint personnel as required by this part of the Works Information.

Environmental roles and responsibilities shall not be restricted to environmental personnel but shall also include other members of the *Contractor's* team, such as project managers, site engineers and foremen.

21.4.3.5 Training and Competence

The *Contractor* shall undertake the following environmental training to ensure that personnel, including Subcontractors and suppliers of any tier, are aware of their individual responsibility in complying with legal and contractual requirements:

- an induction scheme for all personnel;
- toolbox talks for site operatives to maintain awareness on environmental topics and to advise personnel of changing circumstances as work progresses. Toolbox talks shall use as a minimum the Construction Confederation's Environmental Forum's Toolbox Talks (available from <http://www.thecc.org.uk/index.asp?page=whatsnew>). Toolbox talks should cover specific environmental topics relating to a particular location or activity. Toolbox talks shall be undertaken prior to specific activities to which they relate and after nonconformities and complaints; and
- specific environmental training for personnel with environmental responsibilities under the *Contractor's* Environmental Management System

In addition, the *Contractor* shall implement a behaviour-based environmental programme to monitor environmental behaviours of personnel, review the findings and take action to improve environmental behaviours and performance. .

The *Contractor* shall identify training needs of personnel to ensure appropriate training is provided and maintain correct and up-to-date records of attendance at all training, including tool box talks.

21.4.3.6 Not Used

21.4.3.7 Progress Meetings

The *Contractor* shall review environmental issues during progress meetings to check that work is proceeding in accordance with plans and arrangements. This review shall allow for consideration of 4-weekly period reports.

21.4.3.8 Operational Control

The *Contractor* shall plan and implement the operational controls in accordance with this part of the Works Information.

The *Contractor* shall include site-wide operational controls in the Environmental Plan and activity-specific controls in construction health and safety method statements.

21.4.3.9 Evaluation of Compliance

The *Contractor* shall check compliance with legal and contractual requirements through site inspections which shall be undertaken at least weekly by the Environmental Manager. The *Project Manager* shall be invited to attend. Site inspections shall be documented using the site inspection form provided in Appendix

21A. Completed site inspection forms shall be made available to the *Project Manager*.

21.4.3.9A A Nonconformity, corrective and preventive action

The *Contractor* shall raise and manage nonconformities with its *Contractor's* EMS as specified in this part of the Works Information through the PTR system.

21.4.3.10 Internal Audits

The *Contractor* shall undertake environmental audits at least quarterly to cover its entire Environmental Management System over a period of 12 months

The *Contractor* may undertake environmental audits in conjunction with other audits, such as health and safety and quality.

Internal environmental audits shall be undertaken in accordance with the requirements of BS EN ISO 19011.

The *Contractor* shall be aware that the *Project Manager* and *Employer* shall undertake audits and the *Contractor* shall assist with these audits and make personnel and records available.

21.4.3.11 Management Review

The *Contractor* shall undertake a management review at least every six months with the *Project Manager* and the *Contractor's* top management (as a minimum this should include the *Contractor's* Project Director and Quality Manager and a senior corporate representative) and key personnel including the *Contractor's* Environmental Manager. The *Contractor* shall issue a report to all attendees prior to the management review to include:

- performance against Key Performance Indicators and objectives;
- adequacy of environmental staffing;
- training undertaken and planned; and
- analysis of site inspections, audits, incidents and non-conformities including any recurring issues, and time taken to complete actions.

At the management review meeting, the *Contractor* shall develop an improvement plan consisting of agreed actions and including personnel responsible for completing the actions and timescales for their completion.

21.5 Communication with Others

The *Contractor* shall develop and implement as part of their Environmental Plan and Environmental Management System a procedure for communication with local authorities and statutory agencies. .

If an enforcing authority attends site the *Contractor* shall notify the *Project Manager* immediately, assist and keep a record of the visit.

21.6 Procurement

21.6.1 General

The *Contractor* shall include an assessment of environment and sustainability and demonstration of environmental track record as a key criterion in the selection of Subcontractors and suppliers. This shall form part of the *Contractor's* procedure for procurement of Subcontractors and suppliers in line with Quality Management System requirements.

The *Contractor* shall sign up to, and meet the requirements of, The Mayor of London's Green Procurement Code.

The *Contractor* shall ensure that sustainability is incorporated into all procurement activities.

21.6.2 Subcontractors

The *Contractor* shall ensure that Subcontractors either:

- comply with the *Contractor's* Environmental Management System; or
- comply with their own Environmental Management System that shall be accepted by the *Contractor* and is certified to BS EN ISO 14001 by a certification body accredited by the International Accreditation Forum (e.g. UKAS in the UK).

21.6.3 Equipment, Plant and Materials

The *Contractor* shall develop and implement a green Equipment, Plant and Materials section of the Environmental Plan, setting out the measures to be taken to ensure low or reduced environmental impact, including, but not limited to:

- how preference shall be given to Equipment, Plant and Materials that are:
 - non-hazardous;
 - reused, refurbished or recycled;
 - recyclable;
 - from renewable sources;
 - low(er) in embodied energy;
 - low(er) carbon footprint; and
 - low(er) water footprint; and

- how all timber shall be procured either:
 - from certified recycled, reclaimed or sustainable sources - preference shall be given to recycled or reclaimed sources and all timber shall be supported by chain of custody documentation to verify recycled/ reclaimed or sustainable source, including processes for checking and maintaining records to demonstrate that all timber delivered to site are from such sources; or
 - in accordance with the BREEAM credit (MAT 5) where the *Contractor* is seeking that credit and
 - calculation of recycled content within materials and construction components, using their own tool or the Waste Resources Action Programme (WRAP) Net Waste Tool and Designing Out Waste Tool to be submitted to the *Project Manager* prior to commencement of procurement and quarterly thereafter as part of the progress report for environmental objectives and targets;
 - at least 15% of total material value derives from reused and recycled content in new construction, and aim to exceed 20% by selecting the top opportunities to exceed this figure without increasing the cost of materials, and provide a report on the percentage quarterly thereafter as part of the progress report for environmental objectives and targets.
- options for importing and exporting Equipment by rail and water, including cost and benefits, both fiscal and environmental.

21.7 Environmental Incidents

The Contractor shall comply with the Crossrail Guidance on Environment, Traffic and Planning Incidents (CR-XRL-T1-GGG-CR01-00002).

21.8 Noise and Vibration

21.8.1 General

The *Contractor* shall control and limit noise and vibration levels so that affected properties and other sensitive receptors are protected from excessive noise and vibration levels associated with construction activities. The *Contractor* shall apply Best Practicable Means, as defined under Section 72 of the Control of Pollution Act 1974, to all activities.

The *Contractor* shall be aware of the requirements of Sections 20 and 21 of the Crossrail Act 2008 relating to Section 61 Consent appeals and defence against proceedings in respect of statutory nuisance which amend the appeals procedures under the Control of Pollution Act 1974.

21.8.2 Noise and Vibration section of the Environmental Plan

The *Contractor* shall develop and implement a noise and vibration section of the Environmental Plan for the *works*. The noise and vibration section of the Environmental Plan shall set out how the legal and contractual noise and vibration requirements shall be managed in accordance with in this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced, and updated by the Noise and Vibration Specialist in conjunction with the Environment Manager.

21.8.3 Construction Noise and Vibration Assessments

21.8.3.1 General

The *Contractor* shall undertake noise and vibration assessments of all works and these assessments shall be used to prepare section 61 consent applications, satisfy the requirements of Crossrail's Noise and Vibration Mitigation Scheme, and satisfy the legal requirements of undertakings and assurances.

21.8.3.2 Noise Assessments

The *Contractor* shall predict noise levels at all noise sensitive receptors from construction and demolition activities using a model that implements the calculation procedure set out in BS 5228-1. The *Contractor* shall submit details of any alternative methods of calculating noise to the *Project Manager* for acceptance prior to undertaking the assessment.

The *Contractor's* construction noise assessments shall include:

- a detailed construction method statement identifying the rationale for the work, proposed working practices, working hours and a breakdown of construction methodology;
- site location maps and worksite layout plans detailing the geographical locations of all Equipment for each stage of the works;
- the results of previous construction noise assessments, if applicable;
- details of the model or methodology used to predict construction noise;
- a construction Equipment schedule showing the number, type and make of Equipment used for each stage of the construction, and a listing of sound power levels or activity LAeq levels at 10 metres from the source and percentage on times for each item, using either the 'Update of noise database for prediction of noise on construction and open sites' published by Defra, BS 5228, manufacturer's data ;
- details of proposed on-site noise mitigation measures;
- schedules detailing predicted noise levels;

- list of properties qualifying for noise insulation under the Crossrail Noise and Vibration Mitigation Scheme with the associated predicted noise levels;
- details of properties qualifying for temporary re-housing under the Crossrail Noise and Vibration Mitigation Scheme with the associated predicted noise levels;
- details of properties which are borderline qualification for noise insulation and/or temporary re-housing under the Crossrail Noise and Vibration Mitigation Scheme (i.e. where predictions are within 3dB of the relevant trigger levels given in Table 21.1); and
- any other information requested by the *Project Manager* in order to validate the assessment.

21.8.3.3 Baseline Data

The *Contractor* shall use any baseline noise data included in Volume 2A of the Works Information in its noise assessment. The *Contractor* shall review existing baseline data and shall inform the *Project Manager* of the need to obtain additional baseline data. The *Contractor* shall not commence with data gathering until the *Project Manager* has instructed the *Contractor* to do so and accepted the *Contractor's* proposed methodology for baseline data collection.

The *Contractor* shall be aware that additional baseline monitoring may be required by the local authority and if this is the case the *Contractor* shall immediately inform the *Project Manager* and shall not accept this request from the local authority until instructed by the *Project Manager*.

The *Contractor* shall make provision for calculating demolition and construction noise for each of the core time periods shown in Table 21.1 below.

Where an assessment period is 1 hour the predicted noise levels shall be assessed against the lowest 1 hour baseline level.

Where the calculation interval is specified over a period longer than 1 hour then the calculated level shall be based upon the worst likely hour of activity over that period.

21.8.3.4 Vibration Assessments

The *Contractor* shall carry out an assessment of potential significant vibration impacts that are likely to occur as a result of the *works*. Potential significant impacts will include impacts on the occupants of buildings, on the buildings per se and on vibration sensitive equipment or objects. For the determination of potential significant impacts on buildings and the occupants of buildings proper regard shall be given to the standards and advice given in BS5228-2 and BS7385.

The *Contractor* shall assess the thresholds for potential significant impact for specific properties using the guidance within these standards and submit the assessment for the *Project Manager's* acceptance prior to the *works* commencing.

If a potentially significant impact is predicted at a property, which is a listed building, the *Contractor's* heritage specialist shall input into the vibration assessment and the mitigation proposals.

The vibration assessment shall include a survey to identify any vibration sensitive equipment that could be impacted by vibration from the *works*. Where such equipment or objects are identified the vibration assessment shall include an assessment of the risk of adversely affecting the equipment/objects using appropriate tolerance limits derived for each item of equipment/object or classes of equipment/ objects.

The vibration levels shall be calculated in accordance with the calculation procedures and guidance set out in BS 5228 and TRL report 429.

Where the findings of the vibration assessment show the relevant vibration threshold is predicted to be exceeded, the *Contractor* shall not commence the *works* until a Vibration Control and Mitigation Plan has been accepted by the *Project Manager*. The Vibration Control and Mitigation Plan shall include, but not necessarily be limited to:

- Best Practicable Means of minimising vibration levels including community liaison;
- The physical measures proposed to be used to control vibration on-site and, where appropriate, off-site;
- Vibration limits;
- Proposals for monitoring and reporting vibration levels; and
- A vibration trigger action plan setting out the steps to be taken in the event that vibration limits, or other vibration trigger action levels, are exceeded.

21.8.4 Noise Insulation and Temporary Re-housing

21.8.4.1 General

Where noise assessments have been carried out by the *Project Manager*, Volume 2A of the Works Information includes a Site specific noise assessment, which includes construction planning information, noise assessments, construction methodology, proposed mitigation and an assessment of the properties likely to be eligible for noise insulation and temporary rehousing under the Crossrail Noise and Vibration Mitigation Scheme.

The *Contractor* shall review the contents of the noise assessment carried out by the *Project Manager*, and shall either:

- Confirm in writing to the *Project Manager* within 14 days of the *starting date* that the *Contractor's* proposals for the *works* shall not cause any additional properties to be eligible for noise insulation and/or temporary rehousing; or

- Where the *Contractor* proposes a change to any of the information in the *Project Manager's* noise assessment, which shall cause any additional properties to be eligible for noise insulation and/or temporary rehousing, the *Contractor* shall submit a revised noise assessment to the *Project Manager* for acceptance within 28 days of the *starting date*. In its assessment the *Contractor* shall provide justification for the change and details of any noise control and mitigation methods proposed to reduce the impact as far as reasonably practicable.

In all cases, the *Contractor* shall be responsible for the implementation of any noise control and mitigation, excluding noise insulation and temporary re-housing, including that required as a result of any changes to the *Employer's* construction methodology, and any mitigation identified during the *works* in accordance with this part of the Works Information.

Where the *Project Manager* accepts that further noise insulation and temporary rehousing is required, the *Project Manager* will make arrangements for this to be completed by Others.

The Crossrail Noise and Vibration Mitigation Scheme requires that noise insulation and/ or temporary rehousing for any worksite be implemented prior to commencement of the *works* on Site. The *Contractor* shall provide at least 6 months notice to the *Project Manager* in order that any additional noise insulation can be installed or any additional temporary rehousing can be arranged prior to the start of the part of the *works* which give rise to eligibility. The *Contractor* shall include in his Accepted Programme the date by which he shall notify the *Project Manager* of any additional noise insulation and temporary rehousing and the date by which insulation needs to be installed and temporary rehousing needs to be arranged, which is not less than 6 months from the date of notification of the additional requirement.

The *Contractor* shall, after the initial construction noise assessment, keep under review construction assumptions on which noise calculations and evaluations are based and immediately notify the *Project Manager* whether any additional qualifying properties arise at any point during the *works* in accordance with this part of the Works Information.

21.8.4.2 Noise Insulation and Temporary Rehousing Trigger Levels

21.8.4.2.1 Noise Insulation

The trigger levels given in Table 21.1 shall be used by the *Contractor* to assess eligibility for noise insulation and temporary rehousing in accordance with the requirements set out above.

The total noise levels due to the *works* (pre-existing ambient plus airborne Programme construction noise), measured or predicted at a point one metre in front of the most exposed of any windows and doors in any façade of a building, which is an eligible dwelling, are equal to, or exceed, whichever is the higher of, either:

- any of the criteria in Table 21.1; or

- 5 dB above the pre-existing airborne noise level for the corresponding times of day (i.e. the Relevant Time Periods presented in column 2 of Table 21.1); and
- for a period of 10 or more days of working in any 15 consecutive days or for a total of days exceeding 40 in any six consecutive months.

Time	Relevant Time Period	Averaging Time T	Noise Insulation Trigger Level dB L _{Aeq, T}
Monday to Friday	07:00 – 08:00	1 hr	70
	08:00 – 18:00	10 hr	75
	18:00 – 19:00	1 hr	70
	19:00 – 22:00	3 hr	65
	22:00 – 07:00	1 hr	55
Saturday	07:00 – 08:00	1 hr	70
	08:00 – 13:00	5 hr	75
	13:00 – 14:00	1 hr	70
	14:00 – 22:00	3 hr	65
	22:00 – 07:00	1 hr	55
Sunday and Public Holidays	07:00 – 21:00	1 hr	65
	21:00 – 07:00	1 hr	55

Table 21.1: Noise Insulation Trigger Level Table

21.8.4.2.2 Temporary Re-housing

Temporary re-housing shall be applied where the total noise level due to the works (pre-existing ambient plus airborne Programme construction noise), measured or predicted at a point one metre in front of the most exposed of any windows and doors in any façade of an eligible dwelling, exceeds whichever is the higher of either:

- 10 dB above any of the noise levels in Table 21.1 above; or

- 10 dB above the pre-existing airborne noise level for the corresponding time of day (i.e. the Relevant Time Periods presented in column 2 of Table 21.1); and
- for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months.
- 21.8.4.2.3 Interpretation of the Noise Insulation and Temporary Rehousing trigger levels

The *Contractor* shall:

- Apply a resolution of 0.1 dB in interpreting where eligibility arises if noise levels in Table 21.1 are met or exceeded (e.g. a value of 55dB would not trigger eligibility whereas a value of 55.1dB would trigger eligibility where the trigger level is 55dB); and
- use the minimum one-hour LAeq,T levels at night to define the pre-existing ambient, by selecting a 7-day survey period during which favourable weather conditions existed (wind speed not more than 5m/s and no precipitation) and select the lowest one-hourly value from that data set.

21.8.4.2.4 Determining eligibility for contiguous facades

When determining the eligibility over contiguous facades, the *Contractor* shall use more than one assessment location if the calculations from different noise measurement locations alongside the same façade differ by at least 3dB.

21.8.4.2.5 Monitoring of trigger levels

Where the *Contractor's* noise monitoring shows that trigger levels for noise insulation/ temporary re-housing are being exceeded that would result in additional eligibility, the *Contractor* shall identify whether the planned activity causing those levels will carry on for longer than a period of 10 or more days of working in any 15 consecutive days, or for a total of days exceeding 40 in any six consecutive months, and report the findings to the *Project Manager*.

21.8.4.3 Claims after the start of construction

The *Contractor* shall inform the *Project Manager* within 24 hours of receipt of a claim, from any person in the vicinity of the *works* that:

- after the start of construction work, noise levels actually experienced at their dwelling are such as to cause eligibility for noise insulation/temporary re-housing where none was predicted; or
- received levels are sufficient for eligibility for noise insulation/ temporary re-housing where this was predicted, and that the noise has continued, or seems likely to continue for longer than the temporal period predicted (i.e. for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any six consecutive months).

On receipt of such a claim the *Contractor* shall review the works being undertaken, and if they are ongoing, undertake short term noise or vibration monitoring at the claimant's property. The *Contractor* shall then submit the findings of the review to the *Project Manager* within 5 days of receiving the claim.

Where the *Contractor's* short-term noise monitoring, undertaken in response to a claim, identifies that trigger levels for noise insulation/ temporary re-housing are being exceeded but that operations are being performed in accordance with the conditions of the Section 61 Consent, the *Contractor* shall identify whether the planned activity causing those levels will carry on for longer than a period of 10 or more days of working in any 15 consecutive days, or for a total of days exceeding 40 in any six consecutive months, and report the findings to the *Project Manager*.

The *Contractor* shall:

- identify and implement actions to resolve any valid claim as instructed by the *Project Manager*,
- discuss, in consultation with the *Project Manager*, the results of the review with the claimant and explain the findings and remedial actions to be taken; and
- inform the relevant local authority of the remedial actions if any to be taken in response to the claim.

21.8.4.4 Claims for special cases under the Crossrail Noise and Vibration Mitigation Scheme

Where the *Contractor* is contacted directly by someone who wishes to be considered as a special case under the Crossrail Noise and Vibration Mitigation Scheme, the *Contractor* shall inform the *Project Manager* within 24 hours of receipt of an application.

The *Contractor* shall inform the *Project Manager* of any house boats and mobile homes which are eligible for noise insulation or temporary re-housing in accordance with this part of the Works Information, and where noise insulation is not viable the *Contractor* shall implement alternative mitigation measures as instructed by the *Project Manager*.

21.8.5 Special Case Undertakings and Assurances

The *Contractor* shall be responsible for the discharge and implementation of any noise and vibration control and mitigation requirements specified in any relevant special case undertakings and assurances (see Volume 2A of the Works Information), with the exception of any off-site protection measures such as the installation of noise insulation or the arrangement of temporary re-housing. The *Contractor's* responsibilities shall include, but not necessarily be limited to:

- the assessment of noise and vibration impacts and the specification of noise and vibration mitigation packages;
- implementation of any special case undertaking trigger level action plans prepared by the *Project Manager* in respect of those properties included in

Volume 2A of the Works Information covering properties benefiting from undertakings and assurances;

- noise and vibration monitoring in accordance with 21.8.9 below;
- monitoring of compliance with the requirements of the undertakings and assurances;
- provision of evidence, including the results of site audits and noise monitoring, which demonstrates compliance;
- any other surveys and inspections necessary to meet the requirements of the undertakings and assurances (for example condition surveys for vibration damage);
- in support of the *Project Manager* and *Employer*, regular involvement and engagement with the beneficiaries of undertakings and assurances including the occupants/tenants of buildings protected by undertakings and assurances; and
- regular attendance at meetings and provision of support to the *Employer* and *Project Manager* in the negotiation and consultation on noise and vibration aspects of the undertakings.

21.8.6 Section 61 Consents

21.8.6.1 General

The *Contractor* shall obtain consents under the Control of Pollution Act 1974, section 61, for all works (including underground works) for all Working Areas from the relevant local authority (also see Works Information Volume 2B Part 3 Planning, Environmental and Traffic Consents). The section 61 consent application shall include details of the work to be undertaken, including proposed hours of work, site-specific management and mitigation requirements for noise and vibration, both on and off Site.

The *Contractor* shall submit a control of construction noise and vibration plan to the *Project Manager* for acceptance prior to issuing a section 61 consent application to the local authority. The *Contractor* shall not commence construction activities in the Working Areas until formal section 61 consent has been obtained from the local authority and a copy of the granted consent submitted to the *Project Manager* for information.

The *Contractor* shall:

- use the standard section 61 consent application pro-forma given in Appendix 21B;
- include a sample Information Sheet as required by Part 9 of the Works Information in the Section 61 application;

- submit a control of construction noise and vibration plan at least 10 weeks prior to start of construction to the *Project Manager* for acceptance using the pro-forma in Appendix 21C;
- once accepted by the *Project Manager*, use the control of construction noise and vibration plans as the basis of the *Contractor's* draft section 61 consent applications;
- submit a draft section 61 consent application to the relevant local authority at least 8 weeks prior to the start of construction, unless otherwise agreed with the local authority and *Project Manager* that a draft submission is not necessary;
- submit a formal application for prior consent under section 61 of the Control of Pollution Act, at least 4 weeks in advance of commencement of the *works*, which addresses the comments received from the local authority on the draft section 61 application in accordance with Best Practicable Means;
- in advance of any Section 61 application, provide notification by letter to the relevant local authority naming the person(s) authorised to sign Section 61 consent applications for the *Contractor*;
- provide construction noise model files and assessment spreadsheets on request from the *Project Manager* or relevant local authority for validation purposes;
- provide sufficient information to the *Project Manager* and the local authority, upon request, in the form of electronic calculation spreadsheets or model files for validation of the predictions, including: noise sources, source levels, source and receiver heights, ground correction, distance and screening data and corrections, façade correction, angle of view corrections, percentage on-time and any other necessary information to facilitate the validation process;
- not submit a draft or final section 61 consent application to the local authority until the *Project Manager* has accepted the *Contractor's* control of construction noise and vibration plan; and
- hold regular meetings with the *Project Manager* and the local authority to discuss section 61 consent applications and compliance. The *Project Manager* will advise the *Contractor* on an appropriate schedule for these meetings, which the *Contractor* shall agree with the local authority within 6 weeks of the *starting date*.

Where the *works* are wholly within the borders of one local authority but impact upon other local authorities, the *Contractor* shall obtain section 61 consent from the relevant local authority, and forward a copy of the section 61 consent application to adjoining authorities. Where the *works* span the boundaries of more than one local authority, the *Contractor* shall obtain section 61 consents from each of the relevant local authorities.

Where the *Contractor* is working on the same worksite as Others, section 61 consent may be obtained by either the *Project Manager* or the Principal Contractor to cover the *Contractor's works*. In this case the *Contractor* shall be notified by the Principal Contractor or *Project Manager* as appropriate. The *Contractor* shall provide any materials requested by the *Project Manager* or Principal Contractor required in order to gain such consent, and shall comply with the conditions of the section 61 consents.

21.8.6.2 Working Hours

The *Contractor* shall comply with the working hours below unless otherwise agreed in the section 61 consent, variations and dispensations.

The *Contractor* shall adhere to the core working hours of 08:00hrs to 18:00hrs on weekdays and 08:00hrs to 13:00hrs on Saturdays. The *Contractor* may carry out non-disturbing preparatory work, repairs or maintenance on Saturday afternoons between 13:00hrs and 18:00hrs or Sundays between 09:00hrs and 17:00hrs. Except in the case of an emergency, the *Contractor* shall obtain the *Project Manager's* acceptance in advance of any work required to be undertaken on a Sunday. The *Contractor* shall then obtain the agreement of the local authority (except on sites where 24 hour working has already been agreed by the local authority through the section 61 consent).

All planned activities within and outside of core hours shall be identified in the *Contractor's* section 61 consent application. Justification for extended hours shall be included in the section 61 consent application for any activity not identified as being normally undertaken on a 24 hour, 7 day per week activity as specified below.

Justification shall comprise an explanation of why the *works* cannot be completed within core working hours, the consequences of not being able to work out of hours and the mitigation which shall be put in place to minimise noise and vibration from the work. Justifications shall take into account safety considerations and engineering constraints, for example works on operational railway land that fall under the railway possession regime and rules of the route.

The *Contractor* shall have a period of up to one hour before and up to one hour after the core working hours for start up and close down of activities. The *Contractor* shall undertake only the following activities during the start up and close down periods:

- deliveries to and from site;
- loading;
- unloading;
- arrival and departure of workforce and staff at site and movement to and from place of work;
- general refuelling;

- site inspections and safety checks prior to commencing work;
- site meetings;
- site clean up;
- site maintenance; and
- maintenance and checking of Equipment.

During the start up and close down periods, the *Contractor* shall not operate Equipment giving rise to noise likely to exceed the noise trigger levels for the periods either side of the agreed core working hours as specified in this part of the Works Information or as specified in the section 61 consent. The *Contractor* shall not consider the start up and close down periods an extension of core working hours, and shall take particular care to limit and control disturbance to local residents during these periods.

The *Contractor* shall arrange for deliveries in the start up period to take place close to the end of that period and in the close down period close to the start of that period.

Deliveries shall be arranged to minimise impacts on the road system. Abnormal and special loads may be delivered outside the core working hours provided that this has been approved by the relevant highways department of the local authority.

The *Contractor* shall ensure that all construction related traffic serving the works abides by the agreed hours of working for each specific location. The hours of working agreed with the local authority shall include the timing of deliveries, off-loading and loading from the public highway. The *Contractor* shall ensure that deliveries, other than abnormal loads which are agreed, shall not take place outside the core working hours and the start up and close down periods without the prior agreement of the local authority, or as otherwise advised by the local authority.

The *Contractor* shall ensure vehicles awaiting loading or off-loading do not leave engines running when not directly in use.

Excavated material shall only be removed from the Working Areas by road transportation during core working hours.

Activities that may normally be undertaken on a 24 hours per day, 7 days per week basis will be limited to:

- tunnelling works together with directly associated activities (such as maintenance of tunnelling equipment, construction of cross passages and installation of tunnel linings);
- transportation, storage and removal of excavated material by conveyor, barge and rail;

- operation and maintenance of items of Equipment needed in order to safeguard and support the *works*, such as fans, compressors, generators and batching Equipment, such Equipment shall be shielded in order to provide appropriate noise attenuation;
- collection of data and samples; and
- surface support to the underground work, including welfare facilities, craneage, workshops and stores.

The *Contractor's* section 61 consent application shall describe all works to be carried out on a 24 hour, 7 day per week basis as listed above.

Where the *Contractor* can demonstrate that the Accepted Programme would be significantly affected by not being able to remove excavated material by road outside of the core working hours, the *Contractor* shall obtain the *Project Manager's* acceptance in advance for additional hours for the removal of excavated material. The *Contractor* shall then obtain the agreement of the local authority through a section 61 consent, or variation/dispensation to an existing consent as appropriate.

The *Contractor* may keep items of Equipment running 24 hours per day provided that they are necessary in order to safeguard the works. The *Contractor* shall shield any such Equipment in order to provide appropriate noise attenuation.

The *Contractor* shall collect data and samples outside core working hours on occasion as directed by the *Project Manager*.

The *Contractor* shall undertake certain works, outside the core working hours, namely works requiring temporary possession of roads and railways for safety or operational requirements, to limit disruption to road and railway users and the travelling public, and works in connection with utilities when demand is low.

21.8.6.3 Section 61 Consent conditions

In reviewing the acceptability of any conditions applied to the *Contractor's* section 61 consent, variation or dispensation from section 61 consent the *Contractor* shall check that conditions are reasonable and consistent with those in the *Employer's* model consent conditions given in Appendix 21L.

The *Contractor* shall inform the *Project Manager* immediately of conditions not included in the model consent conditions, or conditions which are considered unreasonable by the *Contractor*.

The *Contractor* shall liaise with the local authority and consult with the *Project Manager* to attempt to resolve any issues with section 61 consents prior to lodging an appeal. The *Contractor* shall be aware that an appeal for a failure to determine a section 61 consent, or an appeal against limitations or conditions contained within a section 61 consent shall be lodged with the Secretary of State within 21 days after the end of the determination period.

21.8.6.4 Dispensations

Where the *Contractor* has to reschedule construction activities which have been granted a section 61 consent, for reasons not envisaged at the time of the submission, the *Contractor* shall submit a dispensation application by post to arrive at the local authority at least 14 days in advance of the start of these proposed activities, and submit an additional copy by email.

The *Contractor* shall obtain dispensation from a section 61 consent for any material changes to consented working methods which are predicted to result in an increase to predicted noise or vibration effects. This is likely to be a revision to working hours, work duration, persistent overrun, or major changes to the proposed construction methodology, for example, changes to major items of Equipment.

The *Contractor* shall submit the dispensation application to the *Project Manager* for acceptance 7 days prior to submitting it to the local authority and shall not submit the application to the local authority until the *Project Manager* has accepted it.

A dispensation shall be sought by means of an application using the dispensation pro-forma given in Appendix 21D, and shall include details of the revised construction programme and/ or method, revised noise and vibration calculations, mitigation measures and eligibility for insulation/temporary re-housing issues resulting from the revised works in accordance with this section of the Works Information.

21.8.6.5 Variations

Where rescheduling relates to work that is of a critical nature for reasons not envisaged and is expected to extend beyond the core working hours or the hours agreed with the local authority in the section 61 consent or exceed the agreed limits and dispensation to the section 61 consent, the *Contractor* shall apply for a variation from the section 61 consent to the local authority. Applications for a variation from the section 61 shall be submitted, by email, to the local authority, by the *Contractor*, at least 48 hours in advance and at least 7 days in advance if works are expected to last for a period of 5 days or more. The variation application shall be submitted using the pro-forma included in Appendix 21E and include the details of the revised construction programme or method and the relevant noise calculations.

21.8.6.6 Over-runs

In the event that pre-planned construction activities extend beyond the hours approved by the local authority in the section 61 consent (including any variations or dispensations) due to unforeseen circumstances, the *Contractor* shall immediately notify (by telephone followed by a confirmatory email) the local authority and the *Project Manager*. The *Contractor* shall use the section 61 overrun pro-forma included in Appendix 21F. This notification shall include the time, location, and nature of the over-run and the *Contractor* shall keep written records of the event, including communication with the local authority. The local authority will provide a telephone number and nominate an officer to receive such notifications.

21.8.6.7 Emergencies

In the case of work required in response to an emergency or which if not completed would be unsafe or harmful to permanent works, the *Contractor* shall inform the *Project Manager* and the local authority immediately by telephone, and follow with an email, of the reasons for, and likely duration of the works. The local authority will provide the *Contractor* with a telephone number and nominate an officer to receive such notifications.

21.8.6.8 Breaches of section 61 consents

If measured noise levels exceed the predicted noise levels contained in the *Contractor's* Section 61 application by more than 3 dB(A) the *Contractor* shall investigate and determine if this was likely to have been due to the works. If the breach was due to the works then the *Contractor* shall check to ensure that Best Practicable Means (BPM) were/are being used to control noise and vibration from the works. All reasonably practicable steps shall be taken to reduce noise and vibration levels.

21.8.7 Local Authority Liaison

The *Contractor* shall make available the results of any noise and vibration monitoring to relevant local authorities. The *Contractor* shall allow access to the Working Areas at all reasonable times for inspection and/or noise measurements by the local authority environmental health personnel, following site specific induction and/or health and safety training.

21.8.8 Not Used

21.8.9 Control Measures

The *Contractor* shall comply with BS 5228 with regard to noise and vibration mitigation options. Where the *Contractor* considers that alternative authoritative guidance and procedures are more reasonable the *Contractor* shall submit proposals for using such guidance and procedures to the *Project Manager* for acceptance prior to deviating from BS5228.

The *Contractor* shall maintain all vehicles, Equipment and noise control measures in good and efficient working order and operated to minimise noise emissions.

21.8.9.1 Selection and Use of Equipment

The *Contractor* shall:

- ensure that each item of Equipment complies with the noise limits quoted in the European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701;
- locate Equipment liable to create noise and/or vibration whilst in operation away from sensitive receptors and use barriers to absorb and/or deflect noise away from noise sensitive areas;

- use Equipment and techniques that are non-vibratory means of dismantling attached buildings prior to demolition;
- not operate any defective Equipment or items fitted with noise control equipment until repaired;
- give preference to fixed items of construction Equipment that are electrically powered rather than diesel or petrol driven;
- use vehicles and mechanical Equipment fitted with effective exhaust silencers;
- shut down or throttle down to a minimum machines in intermittent use during periods between work; and
- house static noise emitting Equipment operating continuously within suitable acoustic enclosure.

21.8.9.2 Reversing Alarms

The *Contractor* shall control and limit noise from reversing alarms and shall use the following hierarchy (in order of preference, with the most desirable option listed first, and the least desirable listed last):

- design the site layout to limit and avoid the need for the reversing of vehicles and ensure that drivers are familiar with the worksite layout;
- utilise banksmen to avoid the use of reversing alarms;
- use reversing alarms incorporating one or more of the features listed below or any other comparable system:
 - highly directional sounders;
 - use of broadband signals;
 - self adjusting output sounders; and
 - flashing warning lights; and
 - set reversing alarms to the minimum output noise level required for health and safety compliance.

21.8.10 Noise and Vibration Inspections and Monitoring

21.8.10.1 Construction Inspections

The *Contractor* shall regularly inspect the *works* to ensure that the steps taken to control construction noise and vibration are compliant with Best Practicable Means and the specific requirements of the Section 61 consent. The *Project Manager* shall be notified immediately of any non-compliance issues.

21.8.10.2 Noise Monitoring

The *Contractor* shall undertake noise monitoring in order to:

- comply with the the Section 61 consent process;
- satisfy the requirements of any consent obtained under Section 61 of the Control of Pollution Act 1974;
- satisfy the requirements of the special case undertakings and assurances where noise mitigation packages must be implemented (see specific requirements in 21.4.8 above);
- satisfy the requirements of the Crossrail Noise and Vibration Mitigation Scheme (see specific requirements set out in the noise insulation requirements above); and
- respond to any complaints or incidents about noise and vibration.

The *Contractor* shall undertake noise and vibration monitoring with particular reference to the trigger action levels, set out in the trigger action plans, which have been prepared for properties which benefit from special case undertakings and assurances (see 21.4.8 above).

The *Contractor* shall develop a noise monitoring programme, including monitoring locations, that aligns with the Accepted Programme and shall submit their monitoring programme to the *Project Manager* for acceptance as part of the noise and vibration section of the Environmental Plan.

The *Contractor* shall also detail the monitoring method to be used and shall submit their method statement to the *Project Manager* for acceptance.

Although it is for the *Contractor* to agree the details of the noise monitoring programme with the *Project Manager* he shall use a combination of unattended monitoring (using semi-permanent equipment), and attended monitoring will be employed.

Attended monitoring shall be carried out weekly, as a minimum, at several locations around the site on a sampling basis in accordance with BS5228 Part 1, unless otherwise accepted by the *Project Manager*. Such monitoring shall be carried out by the noise and vibration specialist

All measurements shall be carried out using current best practice and shall adhere to the relevant guidance on monitoring set out in the Annex G of BS 5228-1 [1]The *Contractor* shall:

- retain all noise monitoring results (tabulated in electronic format) for at least 6 months after the contract end date; and provide data to the Project Manager within 2 days of a request and within 7 days of the end of the related works; and

- maintain an inventory of all noise and vibration monitoring equipment.

21.8.10.3 Noise Monitoring Equipment

Measurements of noise levels shall be undertaken with sound level measuring Equipment conforming to BS EN 61672-1 (IEC 61672-1), Type 1. The sound level meter shall be capable of real time analysis giving statistical levels measurements and measure LAeq, L_Amax and LA90 as a minimum.

Microphones shall be fitted with an all weather microphone protection kit to protect the Equipment from damage. The meter shall be set to record on a fast time response, with random microphone correction.

Semi-permanent Equipment shall be able to provide text alerts to 3-4 designated numbers when any preset trigger values are exceeded. The Equipment shall be capable of setting trigger values for different periods of the day / night. The monitor shall also be capable of being remotely downloaded via GSM modem. Semi-permanent Equipment shall be kept in a secure location which is not publicly accessible. The microphone(s) shall be supported/ located at 1m from the façade of the building and be able to be retracted so that the Equipment can be calibrated weekly.

For attended monitoring Equipment, the *Contractor* shall check the calibration level of the noise measurement instrumentation at the start and end of each survey using a sound level calibrator compliant with BS 7189:1989. Use sound level calibrators which have been calibrated, within two years of use, by a calibration laboratory whose measurements are traceable to national or international standards.

All monitoring Equipment shall be calibrated by an UKAS approved (or equivalent) test laboratory every 12 months, and have test certificates available.

21.8.10.4 Vibration Monitoring

The Contractor shall undertake vibration monitoring in order to:

- satisfy the requirements or conditions of any Section 61 consent from the local authority;
- satisfy the requirements of the vibration control and mitigation plan;
- satisfy the requirements of any special case undertakings and assurances; and
- respond to any incidents or complaints.

Such monitoring shall be carried out by the noise and vibration specialist.

The *Contractor* shall develop a vibration monitoring programme that aligns with the Accepted Programme and shall submit their monitoring programme to the *Project Manager* for acceptance as part of the noise and vibration section of the Environmental Plan.

Continuous vibration monitoring shall be carried out at buildings where significant impacts may affect the occupants of buildings, the building itself or vibration sensitive equipment over an extended period. Attended vibration monitoring shall be used to supplement data obtained from continuous monitoring or in situations where specific temporary activities are the source of the risk. The *Contractor* shall use the vibration measurements to:

- compare measured vibration levels against vibration limits or other threshold levels specified in any trigger action plans agreed with the beneficiaries of special case undertakings and assurances,
- check whether all Best Practicable Means are being used to control vibration levels;
- investigate any vibration complaints;
- compare measured vibration levels against vibration limits or other threshold levels; and
- investigate the reasons for any breach of any vibration limits.

The frequency of vibration monitoring shall depend upon the intensity of the construction activity and the risk of the occurrence of a significant impact. The risk of a significant impact shall depend upon, amongst other matters, the level of vibration, the time of day, duration of exposure and the usage of premises.

Where vibration monitoring is required measurements and calibration of equipment shall be made following the guidance in BS 5228-2.

As well as the results of the vibration monitoring, detailed observations of various factors shall be recorded, including:

- condition of the building;
- construction activities which may give rise to significant vibration;
- other extraneous vibration inducing activities (e.g. train or HGV movements);
- indicative ambient vibration levels, including transient event peaks;
- mitigation measures in place; and
- whether Best Practicable Means are in use at the time of the vibration monitoring.

21.8.11 Communications and Reporting

All communications with the owners and occupiers of properties who may be affected by noise and vibration from the *works* shall be managed by the *Contractor* with prior agreement from the *Project Manager*.

The *Contractor* shall submit the format of reports for the *Project Manager's* acceptance:

- reporting to the local authority and meeting the requirements of the Section 61 application/consent; and
- reporting to key stakeholders to whom special case undertakings and assurances have been made.

Noise and vibration monitoring reports shall be submitted to the local authority and key stakeholders weekly (unless otherwise agreed with the local authority/ key stakeholders and the *Project Manager*) and the *Contractor* must comply with any specific requirements imposed by the local authority.

21.9 Waste and Materials Resource Management

21.9.1 General

The *Contractor* shall manage the excavated materials and demolition and construction wastes generated from the Working Areas in accordance with the waste hierarchy described in this part of the Works Information and in a cost efficient manner.

The *Contractor* shall manage waste Consents, such as environmental permits and exemptions, in accordance with Works Information Volume 2B Part 3 Planning, Environmental & Traffic Consents.

The *Contractor* shall be aware that permanent disposal of waste or spoil within the powers of the Crossrail Act 2008 requires a Schedule 7 consent.

The *Contractor* shall be aware that the *Employer* has an agreement with HM Customs and Excise that all hazardous waste sent for disposal from the Project prior to 1st April 2012 will be exempt from landfill tax provided that advance notification is provided. The *Contractor* shall provide such information, as required by HM Customs and Excise, to the *Project Manager*, at least 4 weeks in advance of the start of disposal operations, or prior to the use of a different landfill site. The *Contractor* shall ensure that it has received confirmation from the *Project Manager* that Her Majesty's Revenue and Customs have been notified prior to commencing disposal.

The *Contractor* shall use the Crossrail version of the Building Research Establishment Smartwaste software to record waste information and data.

21.9.2 Site Waste Management Plan

The *Contractor* shall produce a Site Waste Management Plan and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Site Waste Management Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made

within the *period for reply*. The *Contractor* shall not commence work on site until the *Project Manager* has accepted the Site Waste Management Plan.

The Site Waste Management Plan shall be:

- produced and updated by the Waste Manager in conjunction with the Environment Manager;
- appropriate to all activities included in the *works*; and
- part of the *Contractor's* environmental management system.

The Site Waste Management Plan shall include (but not necessarily be limited to):

- the management processes and procedures for complying with legal waste requirements and all the waste requirements of the Works Information - it may include existing corporate procedures, plans or other documents provided that these meet legal requirements and the requirements of the contract. ;
- the roles and responsibilities including the job title of the nominated person responsible for each task;
- the processes for liaison and communication with Others, including neighbouring contractors and statutory bodies, where required by this part of the Works Information;
- the processes for liaison and communication with subcontractors and suppliers of any tier and ensuring compliance with the requirements described in this part of the Works Information;
- sample(s) of waste transfer notes that will be used;
- specific measures for the handling and management of excavated materials and waste in accordance with the waste hierarchy;
- auditing the actions of other parties in the waste handling chain;
- procedures for the administrative arrangements for record keeping; and
- the information and data that the *Contractor* shall input to the Crossrail version of the Building Research Establishment's Smartwaste software as a section of, or appendix to, the Site Waste Management Plan including: a list of actions to reduce, reuse and recycle waste; and an estimate of the total quantities of waste (in tonnes), the estimated reuse and recycling rates and percentage of reused and recycled content after mitigating actions (distinguishing

construction, demolition and excavation wastes) which shall be used for reviewing performance against waste targets;

- The Crossrail version of the Building Research Establishment's Smartwaste software will initially be populated by the *Project Manager* who will be responsible for providing the initial waste forecast for this contract. Thereafter the *Contractor* shall keep up-to-date all information and data in the Crossrail version of the Building Research Establishment's Smartwaste software.

The *Contractor* shall comply with the DEFRA Guidance, Non-statutory guidance for Site Waste Management Plans, April 2008.

The *Contractor* shall train all personnel, including Subcontractors, with direct or indirect responsibilities under the Site Waste Management Plan, on the contents of the Plan that apply to their work in accordance with this part of the Works Information.

21.9.3 Waste Hierarchy

The *Contractor* shall use the national hierarchy for management of excavated materials and demolition and construction waste. The national hierarchy is, in order of preference, with the most desirable option listed first and the least desirable option last:

- minimise the generation of material;
- reuse and/or recycle materials within the Project or Programme;
- reuse and/or recycle materials for beneficial use on other projects; and
- dispose of material at licensed sites.
- Excavated materials and waste shall only be disposed of at landfill sites if all other options have been fully investigated by the *Contractor*.

The *Contractor* shall:

- develop and implement waste minimisation techniques including, but not limited to:
 - manage materials storage to prevent spoilage, damage and contamination;
 - minimise wastage allowances;
 - avoid, reduce and reuse packaging;
- adopt methods that maximise off-site manufacture and assembly and modularisation of components taking into account the benefits of this, such as

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dealing with limited space available on the worksites, time savings, financial savings, improved health, safety and working conditions by reducing work on-site, improved environmental performance, improved productivity, reduced numbers of deliveries, commissioning advantages from installing pre-tested items, and improved product quality and operational control;

- develop and implement on-site segregation of surplus Equipment and Plant and Materials, including demolition waste, surplus materials and packaging for reuse or recycling;
- re-use the excavated material and construction and demolition waste within the Project and Programme, and on or near to the sites where it is generated (preferably in higher value applications), and where this is not feasible, identify suitable projects or other opportunities for re-use of the excavated material and construction and demolition waste, preferably within the Greater London area;
- maintain records of the volumes/quantities and types of surplus materials when these do arise and identify potential beneficial use; and
- develop a materials register for submission to the *Project Manager* at hand-over that identifies main material types in the construction works to facilitate recycling during deconstruction.

Contaminated material that is reused shall be remediated to make it suitable for reuse, by the *Contractor*, or if the material is not suitable for reuse, shall be transported to treatment facilities. If no other options are acceptable to the *Project Manager*, the *Contractor* shall transport contaminated material to licensed landfill sites.

21.9.4 Performance in managing and reducing waste

To assist in meeting the *Employer's* commitment to Government waste reduction targets, the *Contractor* shall:

- include in the Site Waste Management Plan targets for waste reduction, reuse and recycling which meet or exceed the performance stated below; and
- reduce waste to meet the following targets:
 - reuse and recycle at least 95% of clean excavated waste, and aim to achieve 100%;
 - reuse and recycle contaminated waste to achieve a target to be instructed by the *Project Manager*, and
 - reuse and recycle at least 90% of demolition waste, and aim to exceed 95%;
 - reuse and recycle at least 90% of construction waste, and aim to exceed 95%.

Where materials arising from the works are transferred via a materials recycling facility, the *Contractor* shall obtain data from the operator of the facility on the final destination of the waste and shall use this information to ensure that overall waste targets as given above are met.

21.9.5 Duty of Care

The *Contractor* shall comply with Waste Management – The Duty of Care, A Code of Practice (HMSO March 1996) except where superseded by changes in waste law made since its issue in 1996.

21.10 Air Quality

21.10.1 General

The *Contractor* shall control and limit emissions of gaseous and particulate pollutants from vehicles and Equipment and dust and other atmospheric emissions from construction activities to the atmosphere from the Working Areas. The *Contractor* shall identify potential sources prior to the commencement of *works* and shall apply appropriate control techniques throughout the *works*. This should include consideration of the impacts of using volatile substances on site and the selection of low volatility alternatives.

The *Contractor* shall develop and implement an air quality section of the Environmental Plan setting out how all legal and contractual dust and air quality requirements shall be managed as specified in this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced and updated by the Air Quality Specialist in conjunction with the Environment Manager.

21.10.2 Vehicle and Equipment Emissions

The *Contractor* shall implement the following measures to limit emissions and avoid nuisance:

- not leave the engines of vehicles and Equipment running unnecessarily;
- maintain vehicles and Equipment through a programme of routine servicing completed in accordance with the manufacturer's recommendations and keep records for the work undertaken;
- locate haul routes and operate Equipment away from potential sensitive receptors including, but not limited to, houses, schools and hospitals;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment; and
- use commercial road vehicles that meet Euro 3 standards during the works as set out in the EC Directive 98/69/EC (commonly known as Euro standards).

all non-road mobile machinery shall:

- use fuels with a sulphur content equivalent to ultra low sulphur diesel fuel meeting the specification within EN590:2004:
- comply with the current or immediately previous EU Directive Staged Emission Standards; and
- if not compliant with Euro III(b) or IV, and the power output is over 37kW, be fitted with an after-treatment device(s) stated on the approved list managed by the Energy Saving Trust, and ongoing conformity to a performance standard to be defined by the *Project Manager* shall be ensured through a programme of on-site checks which shall be recorded. This requirement may be relaxed on a case-by-case with prior acceptance of the *Project Manager*.

21.10.3 Dust

21.10.3.1 General

The *Contractor* shall design and implement measures to reduce the impact of dust from the Working Areas on the air quality in neighbouring areas prior to commencement of works that have the potential to release dust into the atmosphere.

21.10.3.2 Dust Risk

The *Employer* has assessed the dust risk for each worksite and categorised each as follows:

- Tier 1 – low risk of dust emissions
- Tier 2 – medium risk of dust emissions, real time monitoring required
- Tier 3 – high risk of dust emissions, real time monitoring required.

These tiers for dust risk have been assessed on the basis of site activities and sensitivity of nearby receptors.

The *Project Manager* shall inform the *Contractor* if these additional receptors result in a change of Tier for dust risk and associated control measures, inspections and monitoring, which the *Contractor* shall then implement.

21.10.3.3 Dust Monitoring

The *Contractor* shall undertake dust monitoring for each tier 2 (medium risk) and tier 3 (high risk) worksite identified in Works Information Volume 2A.

The *Contractor* shall:

- undertake monitoring using Osiris, Topaz, DustScan monitors (or equivalent subject to the acceptance of the *Project Manager*);

- deploy a minimum of two instruments at each worksite positioned at the site boundary, at potential receptors or in a transect orientated to the prevailing wind to suit the worksite characteristics;
- obtain any consents and other statutory approvals required in order to install and operate dust monitoring equipment;
- retain all dust monitoring results for at least 6 months after the contract end date; and provide data to the *Project Manager* within 2 days of a request and within 7 days of the end of the related works; and
- assist the *Project Manager* and *Employer* in consultation with stakeholders and statutory undertakers as required, including the preparation of reports, presentation of materials and attendance at meetings.

21.10.3.3.1 Dust monitoring plan

As part of the air quality section of the Environment Plan, the *Contractor* shall prepare a dust monitoring plan for each worksite identified in Works Information Volume 2A. The dust monitoring plan shall describe the *Contractor's* method for dust monitoring and the proposed locations for dust monitoring stations and, as a minimum, include the following requirements:

- the type of instruments to be deployed;
- a list of any consents and other statutory approvals the *Contractor* needs to obtain in order to locate and install dust monitoring equipment;
- a site action level;
- procedures for the collection and interpretation of monitoring data and providing period dust monitoring reports (to include analysis of dust monitoring data, breaches of site action level and summary of actions taken) the *Project Manager* or on a more frequent basis as agreed with the *Project Manager*;
- procedures for reporting any breach of site action levels to site supervisors, the *Project Manager*, the other stakeholders as advised by the *Project Manager*, and
- procedures for responding rapidly to the site action level being breached, including remedial measures.

21.10.3.3.2 Baseline Monitoring for Tier 3 (High Risk) Worksites only

The *Contractor* shall establish a baseline prior to the commencement of *works* for each Worksite identified in Works Information Volume 2A. In establishing this baseline, the *Contractor* shall:

- ensure that a minimum of four weeks of baseline data is recorded prior to commencement of *works*;
- install dust monitoring equipment and alarm and ensure that it is all fully operational within two weeks of the relevant access date for the worksite or commencement of site mobilisation whichever is the later;
- use information derived from a 12 month period derived from data sourced from local background PM10 concentrations measured by the Automatic and Urban Network (AURN) monitoring sites and appropriate local authority monitoring sites;
- establish the annual average, 24 hour average and peak (15 minute) PM10 concentrations;
- use data from more than one monitoring location if located at a similar distance from the worksite;
- collect data as PM10 $\mu\text{g.m}^{-3}$;
- store the annual average, 24 hour averages and record the number of breaches of the 24 hour standard ($50\mu\text{g.m}^{-3}$) for future reference;
- update baseline annually during the *works* for each worksite; and
- avoid local, unidentified sources which may create a false baseline; and note any unusual activity in the vicinity of monitoring sites that may affect monitoring results.

21.10.3.3.3.Site Action Levels

The *Contractor* shall set up the dust monitoring equipment to operate an alarm (PC-based or mobile phone) when a pre-determined site action level is reached.

For tier 2 (medium risk) sites, the *Contractor* shall set a site action level of $250\mu\text{g.m}^{-3}$ (15 minute average).

For tier 3 (high risk) sites, the site action level will be agreed between the *Project Manager* and the local authority and any relevant statutory authorities by reference to the baseline data collected. Subject to consultation with the *Project Manager* and local authority, a preliminary site action level of $250\mu\text{g.m}^{-3}$ (15 minute average) shall be adopted by the *Contractor*.

When the site action level is reached, an alarm will be triggered and then the *Contractor* shall:

- immediately undertake an investigation of activities on site, by the *Contractor's* nominated person, to ascertain if any visible dust is emanating from the site or activities are occurring that are not in line with specified dust control measures;

- notify the *Project Manager* within 24 hours of the trigger action level being reached;
- rectify any identified causes, record actions in the dust log pro-forma included in the Works Information Volume 2B Part 21 Appendix 21M, and notify the *Project Manager* of actions; and
- if the cause of the site action level being breached is not related to site operations, record the outcome of the investigation in the dust log pro-forma included in the Works Information Volume 2B Part 21 Appendix 21M, and report to the *Project Manager* as soon as the investigation is complete.

Review 15 minute averages and where there are frequent occurrences exceeding the preliminary site action level of $250\mu\text{g.m}^{-3}$ the *Contractor* may propose a higher site action level. For tier 2 (medium risk) sites this will be subject to acceptance by the *Project Manager*. For tier 3 (high risk) sites, this will be subject to acceptance by the *Project Manager* and consultation with the local authority.

21.10.3.4 Dust Control Measures

The control measures and inspections described below are the minimum requirements that apply to all Working Areas. The *Contractor* shall be aware that schedule 7 consent decision notices issued by the local authority may specify additional dust control measures to those specified in this Works Information.

For Tier 1 (low risk), 2 (medium risk) and 3 (high risk) Worksites the *Contractor* shall:

- not burn any materials;
- provide an adequate water supply to the Working Areas;
- dispose of run-off water from dust suppression activities, in accordance with the appropriate legal requirements and this Works Information;
- maintain all dust control equipment in good condition and record maintenance and servicing activities;
- keep site fencing, barriers and scaffolding clean using wet methods;
- provide easily cleaned hardstanding for vehicles;
- ensure regular cleaning of hardstandings using wet sweeping methods;
- not allow dry sweeping of large areas;
- provide and ensure the use of wheel wash facilities near the site exit wherever there is a potential for carrying dust or mud out of the Working Areas onto the highway;

- fit wheel wash facilities with rumble grids to dislodge accumulated dust and mud prior to leaving the Site wherever there is a potential for carrying dust or mud out of the Working Areas;
- ensure there is an adequate area of hard surfaced road between wheel wash facilities and the Working Area exit, wherever site size and layout permits;
- install hard surfaced long term haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned;
- inspect haul routes for integrity and instigate necessary repairs to the surface immediately;
- regularly damp down un-surfaced haul routes and Working Areas in dry conditions;
- routinely clean public roads and access routes using wet sweeping methods;
- position the exhausts of vehicles working on site to minimise the risk of re-suspension of ground dust (exhausts should point upwards where this is possible according to vehicle design and preference shall be given to the selection, purchase and use of vehicles and Equipment with exhausts that point upwards);
- impose and signpost maximum speed limits of 5 mph on un-surfaced haul routes and Working Areas and 10 mph on surfaced haul routes and Working Areas (where long haul routes are required, the *Contractor* may submit any proposals for increasing these speed limits including additional control measures to the *Project Manager* for acceptance who, with the assistance of the *Contractor*, will seek the agreement of the local authority);
- fully sheet all vehicles carrying loose or potentially dusty material to or from the Working Areas;
- ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- mix large quantities of cement, bentonite, grouts and other similar materials in designated areas which shall be enclosed or shielded;
- store materials with the potential to produce dust away from Working Area boundaries;
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out;
- minimise the amount of excavated material stockpiled in the Working Areas and sheet, seal or damp down unavoidable stockpiles of excavated material held in the Working Areas;

- avoid double handling of material (wherever reasonably practicable);
- use water suppression during demolition operations;
- hold a copy, on site, of the permit required for any crushing or grinding Equipment used on the site, which falls within the definition in Section 3.5 Chapter 3 of the Pollution Prevention and Control (England and Wales) Regulations 2000 SI1973;
- use enclosed rubble chutes and conveyors on crushing or grinding Equipment or use water to suppress dust emissions;
- use enclosed conveyors where crossing roads, other public areas and property which is not in the ownership or control of the *Employer*;
- sheet or otherwise enclose loaded bins and skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling Equipment and use fine water sprays on such Equipment;
- seal or re-vegetate completed earthworks immediately after completion;
- use design/prefabrication to reduce the need for grinding, sawing and cutting on site; and
- use cutting, grinding or sawing Equipment fitted, or in conjunction with, suitable dust suppression techniques such as water sprays or local extraction.

For Tier 2 (medium risk) and Tier 3 (high risk) worksites the *Contractor* shall also:

- Strip insides of buildings before demolition;
- Bag and remove biological debris (such as birds nests and droppings) or damp down such material prior to demolition;
- Retain walls and windows, wherever reasonably practicable, while the rest of the building is demolished to provide a screen against dust;
- Screen buildings where dust producing activities are taking place with debris screens or sheeting;
- Avoid carrying out earthworks during dry weather if reasonably practicable having regard to programme or provide, and ensure appropriate use of, water sprays to control dust;
- Seed or seal excavated material and soil stockpiles;
- Ensure slopes on stockpiles are no steeper than the natural angle of repose of the material and maintain a smooth profile;

- Ensure equipment is readily available on site to clean any spillages, and clean up spillages immediately;
- Ensure mixing of cement, bentonite, grout and other similar materials takes place in enclosed areas remote from site boundaries and potential receptors;
- Use increased hoarding height, where appropriate, to protect receptors;
- Fully enclose sites or specific operations where there is a high potential for dust production and the site is active for an extensive period.

The *Contractor* may propose alternative control measures provided that the resulting control is at least as effective as that arrived at using the measures specified above. The *Contractor* shall submit any proposals to the *Project Manager* for acceptance and shall not implement them until the *Project Manager* has granted acceptance.

The *Contractor* shall use additional measures to control the dust risk at high risk (tier 3) Worksites, including nominating designated personnel on site to monitor and manage dust emissions.

21.10.3.5 Dust Inspections

The inspections described below are the minimum requirements that apply to all Working Areas. The *Contractor* shall be aware that schedule 7 consent decision notices issued by the local authority may specify additional inspections to those specified in this Works Information.

The *Contractor* shall:

- record all inspections of haul routes and any subsequent action on the dust log pro-forma, to be provided by the *Project Manager*, at least once a day;
- carry out site inspections to monitor compliance with dust control procedures in accordance with this part of the Works Information and record the results of the inspections, including nil returns, in the dust log pro-forma at least once a day;
- increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and
- record any exceptional occurrences causing dust episodes on or off the site and the action taken to resolve the situation.

21.10.4 Odour

The *Contractor* shall adopt measures so as to avoid the creation of statutory nuisance from odours, including, but not limited to:

- covering containers holding waste and regularly removing waste containers from site;

- programming works including, but not limited to, works on sewers;
- removing odour source;
- spraying with an approved oxidising agent; and
- applying an odour guard or masking agent.

21.11 Water

21.11.1 General

The *Contractor* shall undertake the *works* and implement working methods developed to protect surface and groundwater from pollution and other adverse impacts including change to flow volume, water levels and quality and shall do so in accordance with appropriate industry guidance.

The *Contractor* shall avoid interference with surface water features and existing drainage patterns, including important subterranean flows to wetland. Where surface water features, existing drainage patterns, new or extended culverts, stream diversions, and balancing ponds are interfered with as a necessity to Provide the Works the *Contractor* shall ensure:

- that necessary works are positioned, designed and constructed to minimise impacts in terms of flow, minimise or manage flood risk, dewatering, water quality, erosion and/or sedimentation, resulting in adverse impacts on paleoenvironmental, archaeological, ecological or landscape resources;
- continuity of surface flows be maintained to mitigate impacts, by means of stream diversions, creation of natural banks and features. Where these means are not feasible the *Contractor* shall submit a request to the *Project Manager* to use culverts; and
- mitigation of ecological impacts and nature conservation benefits be provided for drainage works.

The *Contractor* shall develop and implement a water section of the Environmental Plan setting out how all legal and contractual water requirements shall be managed as specified in this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced and updated by the Environment Manager.

21.11.2 Consents

The *Contractor* shall be aware of schedule 17 of the Crossrail Act 2008 that differs to normal legislation:

- Part 3: which requires a consent regime for protection of land drainage, flood defence, water resources and fisheries;

- Part 5: which requires a consent regime for protection of land owned by British Waterways Board; and
- Part 6: which requires a consent regime for the protection of the Port of London Authority and the users of the river.

The *Contractor* shall prepare Schedule 17 consent applications using the *Employer's* templates given in Appendices 21I, 21J and 21K. The applications shall include method statements, temporary works drawings, plans, reports and any other supporting information required to meet the consent granting body's requirements. The *Contractor* shall submit these consent applications to the *Project Manager* for acceptance in order for the *Employer* to submit to the consent-granting body for approval.

The *Contractor* shall manage water consents as in accordance with the Works Information Volume 2B Part 3 Planning, Environmental and Traffic Consents..

The Crossrail Act 2008 disapplies various Consents that are required under normal legislation as set out in Works Information 2A.

For Schedule 17 Part 3 the *Contractor* shall submit the following notices to the Environment Agency, using the pro-formas given in Appendices 21G and 21H of this part of the Works Information:

- notice to commence works covered by a Schedule 17 Part 3 consent that has already been obtained by the *Employer* - to be submitted to the Environment Agency 14 days prior to the start of relevant works; and
- notice of completion of works covered by a Schedule 17 Part 3 consent that has already been obtained by the *Employer* - to be submitted to the Environment Agency not later than 7 days after the date on which the works are brought into use.

21.11.3 Site Drainage

The *Contractor* shall:

- ensure that site drainage, including surface run-off and dewatering effluents, be discharged to sewers, unless consent is obtained for alternative discharge arrangements as agreed with *Project Manger*;
- ensure that the site drainage meets the effluent and flood risk standards required by the sewerage undertaker or Environment Agency in accordance with the relevant trade effluent consent or discharge consent or consent under Schedule 17 of the Crossrail Act;
- provide and maintain holding or settling tanks, separators and other measures to meet the sewerage undertaker or Environment Agency's requirements;

- provide access to the statutory undertaker to obtain and analyse samples of discharge and the flows verified as required; and
- comply with the sections of BS6031: Code of Practice for Earthworks for the general control of site drainage.

21.11.4 Protection of Watercourses

The *Contractor* shall:

- control flood risk to appropriate levels set by the Environment Agency, using mitigation, compensation and/or monitoring;
- plan and implement protection measures for works in or adjacent to watercourses to be agreed with the Environment Agency under schedule 17 part 3 of the Crossrail Act 2008;
- maintain watercourses, including land and/or road drainage, within the worksites to provide effective working conditions at all times;
- prevent the deposition of silt or other material in, and the pollution by sediment of, any existing watercourse, canal, lake, reservoir, borehole, aquifer or catchment area, arising from work operations; and
- comply with the Environment Agency's Pollution Prevention Guidance Note 'PPG05: works in, near or liable to affect water courses' and CIRIA's report 'C532: Control of water pollution from construction sites'.

The *Contractor's* pollution prevention measures may include use and maintenance of temporary lagoons, tanks, bunds and silt fences or silt screens, type of Equipment used and the time of the year for working in watercourses.

21.11.5 Control of Pollution of Surface Water

The *Contractor* shall plan and implement protection measures to control the risk of pollution to surface water including, but not limited to:

- any containers of contaminating substances on site shall be:
 - leak proof and kept in a safe and secure building or compound from which they cannot leak, spill or be open to vandalism;
 - protected by impermeable bunds with a capacity of 110% of the maximum stored volume, or if more than one container is stored, 110% of the largest container's capacity or 25% of the total tank capacity within the bund, whichever is greater; and
- transfer of contaminating substances shall be undertaken within similarly protected areas;

- all refuelling, oiling and greasing shall take place above drip trays or on an impermeable surface which provides protection to underground strata and watercourses, away from drains and vehicles and Equipment shall not be left unattended during refuelling;
- only construction equipment and vehicles free of oil/fuel leaks which could cause material contamination shall be permitted on site;
- placing of drip trays below static mechanical Equipment;
- all wash down of vehicles and Equipment shall take place in designated areas and wash water shall be prevented from passing untreated into watercourses and shall comply with Environment Agency's Pollution Prevention Guidance (PPG) note PPG13;
- Environment Agency's Pollution Prevention Guidance (PPG) note PPG 23 shall be followed when carrying out maintenance of structures over water;
- only biodegradable hydraulic oils shall be used in equipment working in or over watercourses; and
- take appropriate measures to protect erodable earthwork surfaces.

21.11.6 Control of Pollution of Groundwater

The *Contractor* shall:

- avoid using materials in the works that could pollute groundwater;
- where the use of List II substances in the Groundwater Regulations SI 1998/2746 (Groundwater Directive: 80/68/EEC) is unavoidable, submit proposals for their use and pollution prevention measures to the *Project Manager* for acceptance 4 weeks prior to their use;
- select and monitor fluids used for shaft sinking and tunnelling to minimise risk of direct contamination of the deep aquifer;
- implement measures to protect the chalk aquifer from impacts, including grout loss and excessive fluid loss; and
- monitor fluids during tunnelling to determine fluid loss.

21.11.6.1 Dewatering

The *Contractor* shall apply the following provisions where dewatering of the *works* is required:

- keeping records of water pumped at all major dewatering sites where wells are constructed in the deep aquifer or where required under the terms of a discharge consent; and

- monitoring water quality at all major dewatering sites on a weekly basis for the first 4 weeks of pumping and monthly thereafter. Such monitoring shall comprise a laboratory test of major ions and a field test of temperature and electrical conductivity as well as other parameters required under the conditions of a discharge Consent or under Schedule 17 of the Crossrail Act 2008.

21.11.6.2 Water Use

21.11.6.2.1 General

The *Contractor* shall consult with the Environment Agency to implement best practice for recycling as much water collected on site as practicable for reuse for construction purposes, such as dust control.

21.11.6.2.2 Office Accommodation

Where the *Contractor* is installing new or upgrading site accommodation, the *Contractor* shall minimise water use including, but not limited to, the following technologies as standard in all site accommodation:

- dual flush toilets;
- push or spray taps to all cold-water supplies; and
- passive infrared (PIR) sensors for urinals.

21.12 Archaeology and Built Heritage

21.12.1 General

21.12.1.1 Mitigation

The *Contractor* shall carry out the *works* in such a way as to ensure that there is no disturbance to scheduled monuments, archaeological sites and deposits, buildings of historical and architectural interest (both statutorily listed buildings and important non-listed above ground features and structural elements). If disturbance cannot be avoided, the *Contractor* shall control and limit this through mitigation measures that are in accordance with legal and contractual requirements.

21.12.1.2 Rights of Entry

The *Contractor* shall be aware of Schedule 10 of the Crossrail Act 2008 which gives rights of entry to English Heritage (or nominated individuals) to any land on which there is a scheduled monument or where works are being carried out to any listed building or building in a conservation area under the powers of the Crossrail Act 2008.

The *Contractor* shall allow English Heritage (or nominated individual(s)) rights of entry to the Site to monitor the archaeological evaluation and mitigation works relating to archaeology, listed buildings, conservation areas and scheduled monuments.

The *Contractor* shall allow the local planning authority access to the site to monitor the archaeological evaluation and mitigation works, where approved by the *Project Manager*.

21.12.1.3 Metal Detectors

The *Contractor* shall not use metal detectors unless prior acceptance has been obtained from the *Project Manager*.

21.12.2 Archaeology

21.12.2.1 General

Under the Crossrail Act 2008, the *Employer* is responsible for developing site specific written schemes of investigation, which detail the archaeological requirements for any particular worksite or group of worksites. These are prepared in consultation with local and statutory authorities.

The *Employer* will appoint a specialist archaeological contractor to implement the archaeological works in accordance with the requirements of the site specific written schemes of investigation.

Any additional works to those included in the site specific written schemes of investigation or resulting from any unexpected finds and subsequent archaeological works will be instructed by the *Project Manager*.

The *Employer's* archaeological contractor will be managed and supervised by the *Project Manager* and their role will include, but not necessarily be limited to, assessment, evaluation and mitigation (including watching briefs and post-excavation work) relating to:

- below ground archaeological resources; and
- above ground buildings, features and structures of historic interest that do not have any statutory protection.

The *Contractor* shall, in liaison with the *Employer's* archaeological contractor, develop and implement an archaeological section of the Environmental Plan, setting out how all legal and contractual archaeological requirements shall be managed as specified in this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced and updated by the Environment Manager.

21.12.2.2 Support to the *Employer's* Archaeological Contractor

The *Contractor* shall provide all necessary support and co-operation to enable the *Employer's* archaeological contractor to plan and undertake archaeological works and comply with the site specific written schemes of investigation. This shall include:

- allowing the *Employer's* archaeological contractor to attend and access site;

- providing Equipment, materials and services, including any programme information, surveys or plans of the *works* as requested by the *Employer's* archaeological contractor, to facilitate assessment, evaluation and mitigation;
- assisting the *Employer's* archaeological contractor in undertaking archaeological works and general watching briefs. This may require the *Contractor* to excavate areas (e.g. trial trenches) and remove spoil (with mechanical plant or hand tools) under supervision of the *Employer's* archaeological contractor;
- allow the *Employer's* archaeological contractor to undertake monitoring of the *Contractor's* works, including periodic inspection and entering the excavations (provided that it is safe to do so) in order to expose, clean and record any archaeological deposits;
- modifying working methods to incorporate targeted watching briefs as set out in the site specific written scheme of investigation, or as instructed by the *Project Manager* on the advice of the *Employer's* archaeological contractor which may require specific controls on the *Contractor's* construction method, such as demolition, site clearance and removal of overburden, topsoil or subsoil;
- allowing archaeological features to be mapped and sampled; and
- taking sufficient care and attention to ensure that the archaeological work is unaffected.

The *Project Manager* will advise the *Contractor* which locations will require attendance by the *Employer's* archaeological contractor (in accordance with the requirements of the site specific written schemes of investigation). The *Contractor* shall only undertake *works* in these areas under the supervision of the *Employer's* archaeological contractor and the routing of construction vehicles and equipment over watching brief areas shall be specified by the *Project Manager*.

The *Contractor* shall notify the *Project Manager* 4 weeks prior to commencing *works* at a worksite that requires attendance of the *Employer's* archaeological contractor. Access shall be organised by co-operation between the *Contractor* and the *Employer's* archaeological contractor, in order to prevent or minimise disruption to the *works*.

The *Project Manager* will inform the *Contractor* of the discovery by the *Employer's* archaeological contractor of any archaeological remains and will advise the *Contractor* of the exact location and timing of any further archaeological assessment, evaluation and mitigation to be carried out.

21.12.2.3 Burial Grounds & Disturbance of Human Remains

The *Contractor* shall:

- for existing burial grounds (those which are either still in use or continue to have the appearance of a burial ground even though no burials may have taken place for some time) where the works will disturb human remains or monuments:

- include in the Accepted Programme timescales to allow for the *Employer's* archaeological contractor and the *Employer* to manage any notices required under Schedule 15 of the Crossrail Act 2008; and
- not proceed with any work in these areas until instructed to do so by the *Project Manager*, and
- for other burial grounds:
 - with a high risk of disturbing human remains, include in the Accepted Programme timescales to allow for the *Employer's* archaeological contractor to obtain licences required under Section 25 of the Burial Act 1857 prior to any ground works in these areas;
 - with a low risk of disturbing human remains or unexpected discovery of human remains, on discovering human remains the *Contractor* shall comply with requirements for dealing with unexpected archaeological finds below and the *Project Manager* will instruct the *Employer's* archaeological contractor to obtain licences required under Section 25 of the Burial Act 1857 prior to recommencing any works in these areas; and
 - comply with any requirements of any licences.

When managing discoveries (or suspected discoveries) of human remains, the *Contractor* shall identify and implement appropriate health and safety requirements, oversight by environmental health officers, preservation of public decency (such as screening of the site) and action in the public interest (such as scientific examination of remains).

21.12.2.4 Unexpected Archaeological Finds

Unexpected archaeological finds are defined as discoveries which could not reasonably have been foreseen from the existing Site Information and which are not reflected in the site specific written schemes of investigation.

In the event of any unexpected finds including archaeological remains, artefacts, finds under the Treasure Act 1996 (unless the *Employer's* archaeological contractor is present) or any event involving the disturbance of human remains, the *Contractor* shall cease work at the identified site, immediately inform the *Project Manager* and not re-commence work at that location until further instruction from the *Project Manager*, has been obtained. This notification may be initially made personally or by telephone but, in the case of human remains shall be confirmed in writing within 24 hours of discovery.

The *Project Manager* shall instruct the *Contractor* regarding any further archaeological works required to be undertaken by the *Employer's* archaeological contractor. Where feasible, further excavation shall be avoided and the archaeological remains shall be recorded by the *Employer's* archaeological contractor.

21.12.2.5 Nationally Important Finds

Should archaeological remains discovered during construction, be confirmed by the *Employer's* archaeological contractor as potentially nationally important (defined using Planning Policy Statement 5: Planning for the Historic Environment (PPS5)) the *Employer's* archaeological contractor will immediately inform the *Project Manager* who will instruct the *Contractor* accordingly.

National significance of the remains will be confirmed by the *Project Manager*, as advised by the *Employer's* archaeological contractor, English Heritage and the relevant local authority and the Secretary of State for Culture Media and Sport.

Where nationally important finds are discovered, the *Project Manager* will consult with the relevant statutory authorities regarding mitigation measures and timescales for implementing them and will instruct the *Contractor* accordingly. The *Contractor* shall allow a period for archaeological recording and excavation that shall not be less than 28 days. The *Contractor* shall be aware that mitigation measures may be decided by the Secretary of State for Transport, who may also extend the timescales for mitigation to be carried out.

21.12.2.6 Ownership of Finds

Ownership of archaeological finds will under no circumstances lie with the *Contractor*.

21.12.3 Built Heritage

21.12.3.1 General

The *Contractor* shall, in liaison with the *Employer's* archaeological contractor, develop and implement a heritage section of the Environmental Plan for the *works*. This shall set out how the legal and contractual heritage requirements shall be managed in accordance with the Works Information. The plan shall include the nominated person responsible for each task and shall be produced and updated by the Heritage Specialist in conjunction with the Environment Manager.

21.12.3.2 Consents

The *Contractor* shall manage heritage consents in accordance with the Works Information Volume 2B Part 3 Planning, Environmental and Traffic Consents, including the specified timescales.

21.12.3.3 Heritage Agreements

Schedule 9 of the Crossrail Act 2008 relates to Listed Buildings and Conservation Areas and disapples some of the controls under the Planning (Listed Buildings and Conservation Areas) Act 1990 for specified Listed Buildings and the demolition of specified unlisted buildings in Conservation Areas.

Listed building or conservation area consent is not required for the specified works to the specified buildings set out in the table in paragraph 1 of Schedule 9 of the Act. Listed building or conservation area consent is not required for any works required

to protect the buildings specified in the table in paragraph 2 of Schedule 9 of the Act, from ground settlement.

For the listed buildings set out in the table in paragraph 1 of Schedule 9 to the Act, a heritage agreement will be in place between the *Employer* and the relevant local authority and English Heritage. The heritage agreement consists of an undertaking and a heritage deed that requires one or more heritage method statements. Details of all existing heritage deeds and heritage method statements are provided in Works Information Volume 2A.

21.12.3.4 Other Heritage Consents

All other works affecting listed buildings or unlisted buildings in conservation areas that are not specified in the Crossrail Act 2008 require consent under the Planning (Listed Buildings and Conservation Areas) Act 1990. The *Contractor* shall identify and manage such consents in accordance with this part and Part 3 of the Works Information.

The *Contractor* shall produce a drawing indicating the extent of the curtilage of the listed building and this shall be included in the heritage section of the Environmental Plan.

21.12.3.5 Method Statements

The *Contractor* shall include the measures to be employed for the protection of listed buildings in its construction method statements for the *works* as required in accordance with the Works Information.

21.12.3.6 Mitigation Measures

The *Contractor* shall ensure that the vibration screening limit for peak particle velocity is less than 3mm/s at and within the curtilage of listed buildings. If the *Contractor* predicts that peak particle velocity shall be greater than 3mm/s, the *Contractor* shall undertake further assessment to determine whether there is anything in the curtilage vulnerable to vibration impacts. If the *Contractor* can demonstrate that the building and associated parts are sufficiently robust to withstand a higher level of vibration without damage, the *Contractor* shall submit the assessment, evidence, proposed Equipment and working methods and proposed higher limit to the *Project Manager* for acceptance. The *Contractor* shall ensure that listed buildings where the vibration screening limit of 3mm/s may be exceeded shall be monitored during demolition and other major activities, providing full safeguarding, which shall include cessation of works should vibration levels exceed 3mm/s. The *Contractor's* Heritage Specialist shall undertake these assessments.

The *Contractor* shall ensure that listed buildings that are attached or contiguous to buildings that shall be demolished shall be unattached, using techniques appropriate for the listed structure, before demolition commences, and consent shall be required and complied with as specified above (heritage deed or listed building consent).

The *Contractor* shall ensure that listed buildings that are located within the proximity of worksites or construction Equipment shall be provided with protection.

The *Contractor* shall notify the *Project Manager* of commencement of works that affect:

- listed buildings or affect their setting or have potential to cause ground movement;
- buildings in conservation areas; and
- historic buildings and structures without statutory protection (as defined below).

The *Contractor* shall plan the works to avoid the need for oversailing of listed and other heritage buildings by cranes and other lifting Equipment. Where this is not practicable, and there is potential for damage to Listed Buildings as a result of falling objects from oversailing cranes, the *Contractor* shall ensure methods shall be used to ensure damage does not occur.

The *Contractor* shall plan for emergency works that may be required to a heritage building or structure.

The *Contractor* shall comply with ground movement requirements relating to listed buildings given in the Works Information.

21.12.3.7 Historic Buildings and Structures without Statutory Protection

The *Contractor* shall be aware that the *Employer* has committed (in the Crossrail Planning and Heritage Memorandum, which is part of the Crossrail Environmental Minimum Requirements) to mitigation for buildings, structures and features of historical interest that do not have any statutory protection.

Assessment, evaluation and mitigation of these shall be undertaken by the *Employer's* archaeological contractor in accordance with the requirements of the site specific written schemes of investigation.

The *Project Manager* will instruct the *Contractor* which buildings, structures and features will require attendance by the *Employer's* archaeological contractor. The *Contractor* shall:

- give the *Project Manager* at least 4 weeks notice of the commencement of intrusive works at these buildings, structures and features;
- allow the *Employer's* archaeological contractor to access the buildings, structures and features of historic interest to undertake surveys;
- not undertake works at these heritage buildings, structures and features until instructed by the *Project Manager*; and
- comply with instructions from the *Project Manager* regarding the implementation of mitigation measures for heritage buildings, structures and features (for example, careful dismantling and salvage and temporary storage of structural elements of particular historic interest).

21.13 Contaminated Land

21.13.1 General

The *Employer* has identified sites that are a potential source of contamination in contaminated land specialist technical reports included in Volume 3 - Site Information.

These sites have been classified as either:

- low risk sites where there is no significant potential pollution linkage and it is not anticipated that further assessment shall be required at these locations; or
- medium or high risk sites where there is potential for significant impacts to human health, groundwater or surface water resources prior to the implementation of suitable mitigation measures.

Any necessary measures shall be agreed with the Environment Agency and the local authorities in conjunction with the *Project Manager* and the *Employer*.

The *Contractor* shall develop and implement a land contamination section of the Environmental Plan for the *works*. This shall set out how all legal and contractual land contamination requirements shall be managed in accordance with this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced, and updated by the Land Contamination Specialist in conjunction with the Environment Manager.

21.13.2 Risk Assessments and Sampling

The *Contractor* shall carry out site assessments, investigations and risk assessments in order to assess the potential for contamination in soil and groundwater in accordance with:

- 'Model Procedures for the Management of Land Contamination' (CLR11), published by DEFRA and the Environment Agency; and
- HSE guidance "Protection of Workers and the General Public during Development of Contaminated Land" (HSG66).

The *Contractor's* site assessments shall be completed for all Working Areas.

The *Contractor* shall carry out risk assessments prior to any works disturbing ground to evaluate mitigation measures and use of personal protective equipment. The *Contractor* shall record any contamination issues in the project health and safety plan in accordance with the Construction (Design and Management) Regulations 2007.

The risk assessment shall include a targeted sampling programme to take soil samples for analysis. The results of any previous sampling are included in Volume 3 - Site Information.

At each sampling location, samples shall be obtained across the soil profile as directed by the Land Contamination Specialist. Additional samples shall be obtained wherever an unusual coloration, odour or soil texture is encountered. The *Contractor* shall be aware that the local authority may require a more extensive sampling strategy.

Soil samples shall be stored, transported and analysed in an appropriate manner by a MCERTS accredited laboratory for a range of analysis according to the historical uses of the site. This shall include, but not be limited to: metals, petroleum hydrocarbons, volatile and semi-volatile hydrocarbons, phenols, polychlorinated biphenyls, asbestos and the physical condition of the soil.

The *Contractor* shall conduct leachability analysis on selected soil samples to determine the mobility of contaminants. The *Contractor* shall assess the leachability results to determine whether significant contaminants are present and the potential to impact controlled waterways.

The *Contractor* shall develop a set of criteria for site investigation prior to the commencement of any intrusive works. The *Contractor* shall submit the criteria to the *Project Manager* at least 4 weeks prior to the start of site investigations for acceptance. The *Contractor* shall not commence any site investigation until the *Project Manager* has accepted the criteria.

The *Contractor* shall ensure that the results of all sampling are readily available to the *Project Manager* and shall submit such results to the local authority, and where groundwater is an identified receptor, to the Environment Agency.

21.13.3 Mitigation

Where site investigation reveals risks from contamination the *Contractor* shall develop and implement an appropriate remedial strategy for dealing with the presence of contamination. The *Contractor* shall submit the remedial strategy to the *Project Manager* for acceptance prior to their implementation, and assist the *Project Manager* and *Employer* in liaison with the local authority, Environment Agency and other relevant statutory bodies regarding control and protection measures. The *Contractor's* remedial strategy shall include:

- assessments of the composition of waste soil using appropriate techniques, which could include sampling and laboratory analysis to determine if the waste is classifiable as hazardous as defined in the European Waste Catalogue;
- consideration of alternatives to landfill disposal which may include the use of remedial technologies (in-situ or ex-situ) or treatment of soils to a standard such that they can be re-used at a site or be disposed of as non-hazardous waste;
- designation of areas within the Working Areas to separate contaminated materials from clean ones and store contaminated materials in an appropriate environment to control any migration of contamination, including specific facilities to prevent contaminants from leaching into the ground, nearby watercourses or neighbouring properties;

- separation of contaminated material from other material, with appropriate protection for the transportation of material (for example covered lorries) to treatment facilities or licensed landfill sites;
- compliance with PPS23 and the Environment Agency's Pollution Prevention Guidance Notes (PPGs), in particular PPG01, PPG02, PPG05, PPG06, PPG21 and PPG23;
- provision of a watching brief by the *Contractor's* Contaminated Land Specialist;
- the identification of remediation measures that are compatible with the construction programme and do not increase cost; and
- methodologies that include an evaluation of impacts and identification of necessary controls.

The *Contractor* shall keep a record of any remedial works undertaken to comply with the remedial strategy, and these records shall include: health and safety, waste disposal, chemical testing, photographs of the works and decisions made regarding the acceptability of soils.

On completion of any remedial works the *Contractor* shall produce a verification report to the *Project Manager* for acceptance prior to submitting that report to the Environment Agency and the local authority. The verification report shall include:

- copies of the method statements, plans and health and safety risk assessments;
- as-built drawings of the implemented schemes;
- details of the parties involved in undertaking the work;
- laboratory and in-situ test validation results;
- certificates demonstrating that imported material and/or material left in situ complies with the approved remedial target concentrations; and
- details of waste classification undertaken including waste acceptance criteria testing, quantities of waste sent off site and the destination of all waste soils, copies of all exemptions, licences, permits, waste carrier registration certificates, hazardous waste producer, waste transfer notes, special waste consignment notes.

21.13.4 Unexpected Contamination

The *Contractor* shall monitor excavation works to check for unexpected or unusual materials with a contaminative potential. This material may consist of, but not be limited to, buried drums, tanks or containers, soil, groundwater or liquids with an unusual colour or odour, or other evidence of contamination. If this type of material is encountered the *Contractor* shall stop work in the affected area until the

Contractor has identified the exact nature and extent of the material, undertaken (or amended) risk assessments and amended and submitted the risk assessments and revised mitigation proposals to the *Project Manager* for acceptance. This approach shall be included in the Health and Safety Plan as required by this part of the Works Information.

21.14 Ecology

21.14.1 General

The *Contractor* shall ensure that procedures are implemented to control and limit disturbance to areas of nature conservation interest and protected species. In doing so the *Contractor* shall comply with all relevant nature conservation policy and accepted industry practice, and shall manage ecological consents as required by this part of the Works Information.

The *Contractor* shall develop and implement an ecological section of the Environmental Plan for the *works*, that shall set out how all legal and contractual ecological requirements shall be managed in accordance with this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced and updated by the Ecologist in conjunction with the Environment Manager.

21.14.2 Mitigation Measures

21.14.2.1 General

Prior to the *works* commencing the *Contractor's* Ecologist shall undertake a survey to check worksites for nesting birds, protected species, invasive species, trees and any other ecological features which may require mitigation.

For any ecological mitigation the *Contractor* shall submit a method statement to the *Project Manager* for acceptance prior to commencing the *works*.

21.14.2.2 Nesting Birds

Site clearance (particularly woodland and other trees, and built structures) shall take place outside the breeding bird season (approximately 1st March to the 31st July) to avoid impacts on nesting birds. Where this is not feasible, all woodland, scrub, vegetation and structures shall be checked by the *Contractor's* Ecologist for nesting birds before removal. If any are identified, the *Contractor* shall immediately inform the *Project Manager*. The *Contractor* shall not undertake any *works* in the immediate vicinity of the nest until an assessment has been undertaken by the *Contractor's* Ecologist and appropriate mitigation agreed between the *Project Manager* and Natural England. The *Contractor* shall provide support as instructed by the *Project Manager* and shall implement the required mitigation.

21.14.2.3 Tree Protection

Schedules 18 and 19 of the Crossrail Act 2008 relate to trees on neighbouring land and disapply some of the controls covered by normal legislation. Tree works that are authorised by these schedules of the Crossrail Act 2008 do not require tree

preservation order consent or notification to the local authority for trees located in a conservation area.

The *Contractor* shall only cut or remove trees when instructed to do so by the *Project Manager*. The *Contractor* shall plan the *works* to minimise the impact on trees. Any essential remedial or protective work to trees shall be carried out by suitably trained or qualified personnel.

The *Contractor* shall plan and implement appropriate measures for tree protection to ensure compliance with BS 5837 "Trees in relation to construction", including remedial or protective work to trees, protective fencing and prohibition of storing or dumping materials within the protected area.

21.14.2.4 Unanticipated Discovery

In the event of any unanticipated ecological discoveries, including but not limited to: nesting birds; protected species; and invasive species, the *Contractor* shall cease work at the identified site, immediately inform the *Project Manager* and not recommence work at that location until further instruction from the *Project Manager* has been obtained.

21.14.2.5 Generic Protection Measures

All sensitive receptors shall be identified and cordoned off where practicable or other protection measures put in place to avoid accidental damage. All site staff should receive appropriate instruction on the presence of these areas via toolbox talks.

21.14A Sustainable Transport

21.14A.1 General

Sustainable transport is minimising the impacts of the *Contractor's* transport of equipment, excavated material, waste and all personnel to and from places of work. The *Contractor* shall use the hierarchy for sustainable transport given below:

21.14A.2 Sustainable Transport Plan

The *Contractor* shall develop and implement a sustainable transport section of the Environmental Plan for the *works*. The sustainable transport section of the Environmental Plan shall set out how the legal and contractual sustainable transport requirements shall be managed in accordance with this part of the Works Information. The plan shall include the nominated person responsible for each task and a single individual responsible for overall production, implementation and update of the plan. This shall include:

- how the *Contractor's* construction vehicle movements shall be minimised;
- an assessment of why rail or water transportation are not suitable in cases where the *Contractor* intends to use road transportation;

- how the *Contractor* shall encourage the use of public transport, car sharing, park and ride and cycling by all personnel;
- provision of focussed public transport packs for all construction workers;
- promotion of efficient vehicle use (including minimising part-loads and use of pool vehicles); and
- measures to control nuisance “fly-parking” by personnel, in particular where this would result in potential safety problems or would affect the ability of local residents or businesses to park.

21.14A.3 Sustainable Transport of Equipment

The *Contractor* shall maximise the use of rail and water transportation in delivering the *works*. In considering its modes of transportation the *Contractor* shall:

- review the modes of transport available at each worksite;
- review the need to minimise road transportation;
- configure inbound and outbound transportation to worksites to remove the need for road transport;
- adopt strategies to reduce the use and impact of road freight where it has to be used;
- review the overall journey mileage and carbon dioxide emissions using guidance in Transport for London’s “London Freight Plan – sustainable freight distribution: a plan for London”; and
- assess the best option using the carbon dioxide shadow cost methodology specified in the Department for Transport’s “Transport Analysis Guidance (WebTAG)”.

The *Contractor* shall support the principles of TfL’s “London Freight Plan – sustainable freight distribution: a plan for London”.

21.14A.4 Sustainable transport of personnel to and from places of work

The *Contractor* shall encourage the use of public transport by personnel.

Some on-site parking will have to be provided to enable specialist equipment to access sites. Where car parking on the Site is potentially possible, such space will be designated and users will be issued with a pass issued by the *Contractor*, in liaison with the *Project Manager*, authorising parking of that car at that location.

21.15 Energy

21.15.1 General

The *Contractor* shall investigate options for procuring energy from renewable sources such as through green electricity suppliers. The *Contractor* shall submit these options, including costs and benefits, to the *Project Manager* for acceptance at least 4 weeks prior to procuring energy.

The *Contractor* shall implement energy efficiency measures which shall include, but not be limited to:

- the purchase and hire of energy efficient (including fuel efficient) Equipment and equipment where it is cost-effective;
- the installation of electricity metering, and sub-metering where there are uses on site that consume large amounts of electricity;
- maximising energy efficiency (which may include using alternative modes of transport, maximising vehicle utilisation by ensuring full loading and efficient routing);
- monitoring and enforcing compliance with energy efficiency measures by the *Contractor's* employees; and
- ensuring that all Equipment is appropriately maintained according to maintenance schedules to ensure that they are operating in an energy efficient manner.
- The *Contractor* shall develop and implement an energy section of the Environmental Plan for the *works* setting out how all legal and contractual energy requirements shall be managed as specified in this part of the Works Information. The plan shall include the nominated person responsible for each task and shall be produced and updated by the Environment Manager.

This part shall be read in conjunction with Works Information Volume 2B Part 26 Logistics Management.

21.15.2 Targeting, Monitoring and Reporting Energy / CO₂

21.15.2.1 Energy / CO₂ Arising from Site Activities

The *Contractor* shall monitor, report and set targets for CO₂ or energy arising from site activities. The *Contractor* may use relevant data obtained for the reporting of KPIs as a basis for this activity but as a minimum the *Contractor* shall undertake the following activities:

- set appropriate target levels of energy consumption. These may be annual, monthly or project targets and should be included in the Environmental Plan under Objectives and Targets as specified in this part of the Works Information;

- display targets in site offices;
- undertake daily monitoring of metered gas (where used) and electricity. Undertake on-going monitoring of bulk fuel purchase. As a minimum monitoring should include displaying some form of graphical analysis in site offices to show consumption over the project duration and how actual consumption compares to the targets set;
- identify any unexplained consumption, and enforce actions to rectify any such consumption; and
- nominate an individual who will be responsible for the monitoring and collection of data, and whose roles and responsibilities as energy champion will be included in the Environmental Plan.

21.15.2.2 CO2 Arising from Transport to and from Site

The *Contractor* shall monitor and report CO2 or energy arising from transport to and from Site. The *Contractor* shall undertake the following activities:

- set up a site monitoring system to monitor and record deliveries (including both deliveries direct to and from the worksites and deliveries to any Crossrail logistics location). This system shall include:
 - the number of deliveries – also recorded by the *Contractor* under Part 26 of this Works Information;
 - the mode of transport – also recorded by the *Contractor* under Part 26 of this Works Information; and
 - the kilometres / miles travelled for all deliveries; and
 - estimate and display the kg of CO2 arising from transport to and from site based on the records described above.

These activities shall be reported via the Employer's Traffic Coordination Centre (see Works Information Volume 2B Part 26 Logistics Management. Where a delivery is specifically for the Site a figure of the total distance travelled shall be used (from the point of origin, to the Site and back to the point of origin). Where a delivery is part of a multiple delivery route, the recorded figure shall be the distance travelled to the site (from the previous delivery), plus the distance to the next delivery or return.

21.16 Site Lighting

The *Contractor* shall provide lighting and signage to ensure the safety and security of all Working Areas. Lighting shall be at the minimum luminosity necessary. The *Contractor* shall provide lighting to the *boundaries of the site* and sufficient illumination to provide a safe route to the passing public. The *Contractor* shall

implement precautions to ensure there are no unlit areas by the Site hoarding on surrounding footpaths, roads and amenity areas.

The *Contractor* shall comply with industry standard procedures for site lighting, including BS5489, Code of Practice for the Design of Road Lighting and the Guidance Notes for the Reduction of Light Pollution (Institute of Lighting Engineers, 2000).

The *Contractor* shall design, position and direct lighting so as not to unnecessarily intrude on adjacent buildings, wildlife sites, land uses and so as to prevent unnecessary interference with local residents, railway operations, passing motorists, or the navigation lights for air or water traffic. The *Contractor* shall take particular care in Working Areas where night working is required.

The *Contractor* shall develop and implement a lighting section of the Environmental Plan setting out how all legal and contractual energy requirements shall be managed in accordance with this part of the Works Information.

21.17 Electromagnetic Interference

The *Contractor* shall assess the impacts of electromagnetic interference on wireless telecommunication systems, for example from the demolition of buildings and the installation of tower cranes. The *Contractor* shall employ best practice technology to ensure that levels of radio frequency interference are low and at acceptable levels.

21.18 Geology

The *Contractor* shall notify the *Project Manager* immediately if activities expose or encounter geological deposits or features of high scientific value. The *Contractor* shall allow access for the recording or protection of geological features by approved third parties as identified by the *Project Manager*.

21.19 Soil Resources

The *Contractor* shall identify all areas where topsoil and sub-soil resources are present and ensure that measures are put into place to store and reuse these materials as part of site restoration or identify alternative Crossrail or third party sites where they can be beneficially utilised

21.20 Appendices

- Appendix 21A Site Inspection Form (Pro-forma)
- Appendix 21B Section 61 Consent Application
- Appendix 21C Control of Noise and Vibration Plan (Pro-forma)
- Appendix 21D Section 61 Dispensation Application
- Appendix 21E Section 61 Variation

- Appendix 21F Section 61 Overrun
- Appendix 21G Notification to the Environment Agency of Intention to Undertake Specified Works
- Appendix 21H Notification to the Environment Agency of Completion of Consented Works
- Appendix 21I Schedule 17, Part 3 Consent Application
- Appendix 21J Schedule 17, Part 5 Consent Application
- Appendix 21K Schedule 17, Part 6 Consent Application
- Appendix 21L Section 61 Model Consent Conditions
- Appendix 21M Dust Log Pro-Formas
- Appendix 21N Crossrail Guidance on Environment, Traffic and Planning Incidents (CR-XRL-T1-GGG-CR001-00002)

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Part 22 – Not Used

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Part 23 – Labour Relations

23.1 Introduction

In addition to the requirements described in Part 14 Management and Administration of the Works, Part 15 Responsible Procurement of Volume 2B, of the Works Information, the *Employer* will promote a consistent approach to labour and industrial relations across the Project.

To support this, the *Contractor* shall put in place policies and processes to ensure the effective management of labour and industrial relations on this contract. These policies and processes shall include (but are not necessarily limited to) those required to cover the following *Employer's* minimum requirements:

- reduce or eliminate the risks of industrial unrest;
- provide sound employment practices;
- minimise accidents and work-related ill health;
- ensure a ready supply of skilled labour and reward good performance;
- reduce the churn of employees; and
- avoid incentivising the migration of employees between the *Contractor* and other Crossrail contractors, the *Employer* and the *Project Manager*.

This Works Information covers the *Contractor's* activities that have a potential impact on the industrial relations environment within the contract and the ability of the workforce to safely deliver the works required by the *works* in the most effective and efficient manner.

If deemed applicable by the *Project Manager* an appropriate national agreement will be adopted for the contract.

23.2 Not Used

23.3 Contractor's Labour and Industrial Relations Policy

The *Contractor* shall:

- develop and implement a labour and industrial relations policy that complies with *Employer's* minimum requirements and ensure compliance with it's policy;

- promote the labour and industrial relations policy with employers, trade unions and employee representatives; and
- report to the *Project Manager* in a timely fashion any risks or issues associated with the above requirements.

23.4 Productivity

The *Contractor* shall ensure that the employers and employees use all available working hours as efficiently and productively as possible. Examples of working practices expected include (but are not necessarily limited to):

- all employees will be properly equipped and ready to start productive work at the required time;
- employees will remain at work until the designated finish time;
- breaks will be for authorised and stipulated periods and applied consistently; and
- the site layout will facilitate the most efficient and productive work time utilisation.

The *Contractor* shall ensure that all requirements and arrangements are applied consistently and transparently to all employers and employees.

23.5 Skills and Training

In particular they will be responsible for ensuring that all employees working on the contract:

- perform their work safely, with due skill and diligence and within their level of competence;
- participate in work that is effectively planned and organised;
- are supported by properly trained and effective supervisors and team leaders;
- are provided with appropriate plant, tools and equipment;
- assess, manage and report performance as required.

Employees' competence is to be determined by taking into account all relevant information, including any representations made by a duly appointed safety representative under the Health and Safety at Work Act 1974 and associated regulations.

23.6 Recruitment

The *Contractor* will implement policies to ensure that all employers:

- promote equality of opportunity;
- are committed to creating employment opportunities for people from disadvantaged groups and/or backgrounds;
- encourage and support local labour to take up opportunities to train, to develop skills, to gain qualifications and to take up employment opportunities on the contract; and

23.7 Trade Union Membership

The *Contractor* shall implement policies to ensure that all employers:

- do not prevent or discourage employees from joining trade unions;
- consider reasonable requests for “check off” arrangements;
- where “check off” arrangements exist, only make deductions where employees have given their written consent and have not subsequently withdrawn that consent; and
- provide recognised trade union representatives with appropriate facilities and right to time off to perform trade union duties in compliance with their statutory obligations.

23.8 Managing workforce relations

It is in the interest of all parties to prevent employment issues from escalating into disputes. In this regard the *Contractor* shall ensure:

- all employees are provided with clear and accurate details concerning their terms and conditions of employment and any policies and procedures applicable to their employment;
- early consultation with employees and/or their representatives (as appropriate) on any issues relating to site conditions, logistical requirements or site welfare facilities;
- clear dispute resolution procedures (including appropriate disciplinary and grievance procedures) in compliance with the ACAS code and guidance;
- a commitment from managers, employees, employee representatives and trade union officials to resolve issues quickly and in accordance with agreed procedures; and
- the provision of sufficient training and support for managers and shop stewards to perform their respective roles effectively in relation to dispute management.

The *Contractor* shall also ensure that arrangements are put in place in relation to the following areas:

- working hours – working week, length of the working day, shift patterns including adherence to Working Time Regulations 98 (as amended);
- payment of wages and wage rates (including payment during training and development);
- incentive bonus arrangements;
- overtime arrangements;
- holiday entitlement;
- pension and welfare benefits;
- meal and refreshment breaks; and
- travel and accommodation rates and allowances.

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Part 24 – Inclusivity

24.1 Introduction

For the purposes of this part of the Works Information, inclusivity means proactively seeking to address the barriers to participation, whether as employees, customers or other stakeholders, by all members of the community whatever their identity or access needs.

The *Employer* has established an Inclusivity Policy to address the complex legislative framework that governs the need for the planning, design, construction and operation of the Programme to deliver an inclusive railway system.

The Inclusivity Policy further sets out the *Employer's* aspiration to deliver a railway that exceeds the legislative requirements to:

- contribute to the creation of an inclusive transport system;
- ensure the construction and operation of the Project with the minimum practicable negative impact on Priority Equality Groups (namely women; black and minority ethnic people; disabled people; lesbians, gay men, bisexual and transgender people; faith groups; older people, children and young people, and those on low income);
- contribute to the processes and procedures adopted in the construction and operation of the Project to reduce to the minimum practical level the negative impact on the Priority Equality Groups
- take decisions that affect the public on the basis of evidence and inclusive consultation including consultation with Priority Equality Groups; and
- achieve the greatest practicable benefit to communities by working in partnership with other transport providers, developers and local authorities.

This part of the Works Information sets out the minimum requirements for the *Contractor* to achieve compliance with the *Employer's* Inclusivity Policy.

24.2 Policy Statement

The *Employer's* Inclusivity Policy Statement is attached in Appendix 24A to this Works Information.

24.3 The Contractor's main responsibilities

24.3.1 Application of Inclusivity

The *Contractor* shall:

- Comply with the *Employer's* Inclusivity Policy. ;
- demonstrate inclusivity by adopting an evidence based approach to the needs of the diverse communities affected by the *works*;
- ensure that resources are appropriately allocated and prioritised to activity in the areas of greatest positive impact whether by geography or issue (to be determined in consultation with the *Project Manager*); and
- cooperate with the *Project Manager* to proactively report progress on inclusivity at key and agreed stages.

24.3.2 Consideration of Inclusivity in Providing the Works

The *Contractor's* shall consider inclusivity requirements in Providing the Works including the following activities:

- the development of procedures and plans for delivery of the *works*;
- procurement policies and procedures and contractual frameworks with Subcontractors;
- the provision and dissemination of information about the *works* to the local community (for example information sheets provided as part of the requirements of Works Information Volume 2B Part 9);
- the design of part of the *works* for which the *Contractor* has responsibility to provide, develop or complete the design;
- the design of Equipment or temporary works for the works particularly where the impact on the local community extends beyond the Working Areas;
- the planning and provision of site layouts and accesses and the routing of staff and operatives to and from the Working Areas;
- ensuring that people with reduced mobility and those with other forms of disability continue to have access to services and buildings where access is temporarily disrupted by the *works*; and
- the planning, implementation and subsequent removal of temporary footway and traffic diversions (for example provision of tactile paving on temporary footway diversions).

The *Contractor* shall provide training to employees and subcontractors and suppliers of any tier on the specific inclusivity requirements relating to the *works*.

The *Contractor* shall co-operate with the *Project Manager* and *Employer* in establishing the specific inclusivity requirements relating to the *works* through:

- community engagement with local and London-wide groups and with national groups where no local group is available;
- information gathered from third parties as a result of community representation or engagement;
- research either through existing research findings or through conducting new research;
- an equality impact assessment (as part of the *Employer's* duty under the Race Relations Amendment Act 2000); and
- keeping abreast of demographic, social policy and legislative change as well as technological advancement and state of the art design solutions.

24.4 Appendices

Appendix 24A *Employer's Inclusivity Policy Statement*

Learning Legacy Document

Part 25 – Land Use Planning

25.1 Planning submissions

The *Contractor* shall prepare submissions in relation to planning submissions under Schedule 7 of the Crossrail Act 2008 prepare submissions in accordance with the Crossrail Planning Forum Notes and using the templates given in Appendices 25A - Q

The *Contractor* shall prepare all submissions under the planning applications to be made under the usual legislation i.e. Town and Country Planning Acts using the forms and procedures required under this legislation.

25.2 Appendices

Appendix 25A	Planning Forum Note 1: Content of Submissions and Standard Templates
Appendix 25B	Planning Forum Note 2: Drawings for Plans and Specifications Approvals
Appendix 25C	Planning Forum Note 3: Validation Checklists
Appendix 25D	Planning Forum Note 4: Approval of Construction Arrangements
Appendix 25E	Planning Forum Note 5: Design and Access Statements
Appendix 25F	Planning Forum Note 6: Written Statements
Appendix 25G	Planning Forum Note 7: Consultation on Requests for Approval under Schedule 7
Appendix 25H	Planning Forum Note 9: Model Conditions
Appendix 25J	Planning Forum Note 10: Text for Approvals
Appendix 25K	Planning Forum Note 11: Bringing Into Use
Appendix 25L	Planning Forum Note 12
Appendix 25M	Planning Forum Note 13
Appendix 25N	Schedule 7 Construction Arrangements Written Statement for Information Template
Appendix 25P	Schedule 7 Plans and Specifications Written Statement for Information Template



Appendix 25Q Heritage Deed Appendix 2 Template

Learning Legacy Document

Part 26 – Logistics Management

26.1 Introduction

During the passage of the Crossrail Act 2008, the *Employer* made commitments to:

- minimise road transportation and maximise rail and water;
- ensure beneficial re-use of all uncontaminated excavated material;
- to maximise the use of sustainable transport;
- coordinate all vehicle movements, including the delivery of materials to site and removal of waste and excavated material from site in an efficient and safe manner to reduce impacts and congestion;
- undertake lorry driver training with particular emphasis on vulnerable road users; and
- promote off-site manufacture, the use of consolidation centres and sustainable transport.

This part of the Works Information describes the *Employer's* Logistics Management requirements and the logistical constraints on how the *Contractor* Provides the Works arising from the commitments made by the *Employer*.

26.2 The *Contractor's* Responsibilities for Logistics Management

The *Contractor* is responsible for the Logistics Management of all its activities and those of his Subcontractors and suppliers including:

- all logistics activities within the Site;
- all logistics activities to deliver the *works*;
- all movement of Equipment, Plant and Materials and people to and from the Site and the Working Areas;
- the removal and treatment of all excavated material;
- the coordination of all his logistics activities with Others, including other contractors; and
- developing, planning and implementing logistics solutions to deliver the *works* which support and discharge the *Employer's* commitments;

The *Contractor* shall ensure that the safe delivery of Equipment, Plant and Materials and people including other road users and pedestrians is the overriding priority in all vehicle movements.

26.3 Logistics Manager

The *Contractor* shall appoint a Logistics Manager

The Logistics Manager shall:

- produce and implement the Logistics Plan ;
- organise weekly meetings with the *Project Manager* and record actions;
- co-ordinate with Others (including other contractors) regarding cumulative impacts on or outside of the Site;
- produce report information for the logistics part of the progress report and attend the progress meeting to ensure that the Logistics Plan remains suitable, adequate and effective;
- be the point of contact between the *Contractor* and the Traffic Coordination Centre;
- attend Traffic Liaison Group meetings;

The Logistics Manager shall have the following competencies:

- appropriate experience of logistics management, including demonstrable site experience on construction projects;
- good knowledge and practical experience of legal requirements and how to comply with them, including but not limited to driver hours, vehicle and driving safety;
- good knowledge of safe operational practice for operation of vehicles and Equipment and methods of loading and off-loading;
- good knowledge and practical experience of planning and organising deliveries to/ from sites; and
- experience of liaison with stakeholders including local authorities, the police and Highways Agency.

26.4 Logistics Plan

8 weeks prior to the start of construction activities the *Contractor* shall produce a Logistics Plan and submit it to the *Project Manager* for acceptance. In the case of the first submission of the Logistics Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses

shall be made within the *period for reply*. The Logistics Plan may include existing corporate procedures, plans or other documents provided that these meet legal requirements and the requirements of this contract.

The *Contractor* shall not commence construction activities start construction activities on the Site and the Working Areas until the *Project Manager* has accepted the Logistics Plan.

The template for the *Contractor's* Logistics Plan is included in Appendix 26A. This template includes guidance on the minimum information that shall be included in the *Contractors* Logistics Plan.

The *Contractor* shall ensure the Logistics Plan is appropriate to all logistics activities included in the *works*.

The *Contractor* shall review and update the Logistics Plan at least every 6 months.

26.5 Not Used

26.6 Excavated Material

26.6.1 General

During the passage of the Crossrail Act 2008, the *Employer* made commitments in the form of Undertakings and Assurances and other legal agreements that relate to the manner in which the excavated material arising from the *works* is transported and put to beneficial re-use on other projects or disposed of.

The *Employer* has entered into an agreement with the Royal Society for the Protection of Birds (RSPB) to place uncontaminated excavated material at Wallasea Island in Essex.

The *Contractor* is responsible for transporting suitable excavated material from the Site to the Transfer Site, and unloading at that site, for onwards transportation by Others to Wallasea Island.

Volume 2A of the Works Information states a date by which excavated material can be transported to Wallasea Island. If the *works* generate excavated material prior to this date then the *Contractor* shall be responsible for disposal of that excavated material in line with the requirements of the Works Information.

The *Contractor* is responsible for the transportation and/or beneficial re-use of excavated material and the treatment, transportation and disposal of contaminated or hazardous material.

The *Contractor* shall detail in its Logistics Plan his proposals for meeting all excavated material requirements including.

- how the *Contractor's* proposals shall be planned, managed and implemented;

- details of beneficial re-use location, Transfer Site or disposal location and an assessment of their suitability;
- details any treatment of waste and contaminated material within the Site and Working Areas prior to disposal or post transfer to beneficial use location/Transfer Site/disposal location;
- details of planning approvals for the location including hours of operation and types of material which will be accepted;
- details of the material testing regime and location of such tests;
- the method of transportation to that location such that it minimises the requirement for road transport and maximises rail or water transport;
- evidence of appropriate licences;
- plans to ensure that part loads are not transported; and
- Provision of an electronic waste transfer note process.

26.6.2 Not Used

26.6.3 Load tracking and compliance management

The *Contractor* shall detail in its Logistics Plan how it will track excavated materials from the *works* to the Transfer Site or other sites. The *Contractor* shall ensure that the composition, volume and weight of loads are not altered in course of the handling and transportation. Only excavated materials originating from the *works* shall be delivered by the *Contractor* to the Transfer Site or any other sites.

The *Contractor* shall implement a waste transfer note process and system. The load tracking process shall provide a clear audit trail of all vehicle movements of excavated materials and include full traceability of:

- load identification number;
- subcontractor;
- date;
- volume; and
- weight.

All information shall be made available to the *Project Manager* in electronic format compatible with the Traffic Coordination Centre.

26.6.4 Not Used

26.7 Not Used

26.7.1 Not Used

26.7.2 Not Used

26.7.3 Not Used

26.7.4 Not Used

26.8 Not Used

26.9 Consolidation

The primary aim of consolidation is to minimise vehicle movements by allowing part-deliveries to be consolidated into full loads and parcel loads in such a way that they are incorporated into the *works* with limited storage duration on Site. Additional roles of consolidation are to:

- reduce the cost and risk to suppliers of making deliveries into central London;
- improve construction efficiency by providing planned and controlled delivery operations;
- reduce Plant and Materials on-Site by not delivering more than immediately required;
- minimise waste by reducing packaging and handling waste/excess; and
- maximise demand aggregation and reduce lead times by holding stock.

The *Contractor* shall review and assess the need for consolidation methods and/or consolidation as part of his Logistics Plan.

26.10 Lorry Driver Induction Training

26.10.1 General

During the passage of the Crossrail Act 2008, the *Employer* made commitments in the form of Undertakings and Assurances and other legal agreements that committed the Project to provide mandatory training to lorry drivers working on or in connection (delivery drivers) with the Project.

The *Employer* will provide and implement a lorry driver induction training course for all frequent lorry drivers engaged on this contract, including owner drivers.

The *Contractor* shall ensure that all frequent lorry drivers engaged on the contract, including those employed by subcontractors and suppliers (including owner drivers),

attend the lorry driver induction training course before they work on the contract or reach frequent lorry driver status.

A Frequent Lorry Driver is defined as:

- all excavated material removal vehicle drivers;
- all concrete remixer vehicle drivers;
- all consolidation centre vehicle drivers; and
- any driver of a large goods vehicle either supplying or removing Equipment, Plant and Materials, or people from the site who makes 5 or more round trips in any 12 month period to any Crossrail worksites for any part of the Project.

A Large Goods Vehicle is defined as any vehicle greater than 3.5 Tonnes gross vehicle weight.

A Frequent Lorry Driver will not be allowed to enter or deliver Equipment, Plant and Materials, or people to a Site or Working Areas or lorry holding area until they have completed the lorry driver induction training. Any costs incurred by the *Contractor* in not complying with this requirement shall be Disallowed Costs.

26.10.2 Not Used

26.10.3 Lorry Driver Induction Training Course

The lorry driver induction training course is a 1 day classroom based course lasting 7 hours provided by the *Employer*. The course contributes to the Driver Certificate of Professional Competence (DCPC) as 7 hours periodic training. Drivers shall be required to produce their driving licence at the start of the course as supporting evidence for the accreditation requirement.

The DCPC is for large good vehicles drivers who drive professionally throughout the UK and has been developed as a requirement of the EU Directive 2003/59, which is designed to improve the knowledge and skills of professional large good vehicles drivers throughout their working life. There are two parts to the legislation:

The initial qualification that must be achieved by new large good vehicles drivers along with their vocational licence to enable them to use their licence professionally; and

Periodic training, which involves all professional drivers undertaking 35 hours of training every 5 years.

The course will be held in the facilities provided by the *Employer*..

The *Contractor* shall include a forecast of the number of drivers required to attend the lorry induction driver training course as part of its Logistics Plan. The *Employer* will use this forecast to plan the required number of training courses and will use the next period forecast to book the course.

The *Contractor* shall confirm the drivers required to attend the driver training course and provide their required details to the *Project Manager* at least 2 weeks prior to the *Contractors* requirement for the drivers to attend the course. If the number of drivers exceeds the next period forecast provided by the *Contractor* then the *Employer* cannot guarantee that there will be sufficient capacity for all drivers and the *Contractor* shall prioritise training requirements.

If a driver booked onto the course can no longer attend for any reason, the *Contractor* shall inform the *Project Manager* at least 48 hours prior to the course date. Failure to do so will result in the abortive costs incurred being recovered from the *Contractor*.

Following successful completion of the lorry driver induction training course, the *Project Manager* shall ensure that the training provider issues the driver with certification and a photo ID card (with unique ID number) confirming that they have undertaken the training. The *Project Manager* will forward details of trained drivers to the *Contractor* and Traffic Coordination Centre.

The *Contractor* shall ensure that following successful completion of the course all trained lorry drivers shall wear their photo ID badge, making sure it is clearly visible at all times when employed on the Project and shall make their ID badge available for inspection by the *Project Manager*. The *Contractor* shall maintain records of all drivers that have completed the lorry driver induction training course.

The lorry driver induction training course does not replace any other induction training required by the Works Information.

26.10.4 Infrequent Lorry Drivers – Driver Information Pack

An Infrequent Lorry Driver is defined as any lorry driver, including those employed by subcontractors and suppliers of (including owner drivers), supplying or delivering Equipment, Plant and Material or people from the Site who is not a frequent lorry driver.

The *Employer* will, via the *Project Manager*, provide the *Contractor* with an electronic version of the Project driver information pack.

The *Contractor* shall ensure that all infrequent lorry drivers engaged on the contract are issued with the Project driver information pack before they commence work on the contract, and shall record that all infrequent lorry drivers have read the pack.

The *Contractor* shall audit their own drivers and those of subcontractors and suppliers to ensure the requirements of this Works Information are met.

26.11 Freight Operators and Hauliers

26.11.1 General

The *Contractor* shall ensure that all haulage firms and freight operators engaged on the contract, including owner drivers, are assessed and selected to ensure that they meet the minimum requirements set out in this Works Information. a Freight

Operator or Haulier includes the *Contractor* and subcontractors and suppliers engaged in the following activities:

- removing excavated material or waste;
- delivering Equipment (including temporary works), and Plant and Materials; and
- delivering loads from consolidation centres.

26.11.2 Selection Criteria

The *Contractor* shall demonstrate to the *Project Manager* that the assessment process used for their selection of Freight Operator and Hauliers ensures that they fully embrace all of the *Employer's* environmental, health and safety, sustainability and community relations policies, principles and values.

In selecting Freight Operator and Hauliers the *Contractor* shall:

- ensure they are members of Freight Operator Recognition Scheme (FORS) or equivalent standard ;
- ensure they comply with the Vehicle Safety Equipment Standards;
- ensure they comply the requirements for Lorry Driver Induction Training;
- check company or owner driver references;
- declare any convictions or formal cautions against the companies, their Directors or, if applicable, an owner driver, in the last 5 years; and
- declare any enforcement actions such as an enforcement notice, a suspension notice, a landfill closure notice, or regulation 60 against the companies, their Directors or, if applicable, an owner driver, in the last 5 years.

The perception that a driver must make deliveries as fast as possible or undertake as many deliveries within a given time frame as possible is a potential cause of dangerous driving and accidents. The *Contractor* shall not incentivise drivers,, or allow subcontractors or suppliers of any tier to incentivise their drivers, based on the number of, or speed in which, deliveries are made. The *Contractor* shall ensure that the safe delivery of Equipment, Plant and Materials and people is the overriding priority in all vehicle movements.

26.11.3 Freight Operators Recognition Scheme

If the *Contractor* operates commercial vehicles of any size in the United Kingdom he shall be a registered member of the Freight Operator Recognition Scheme (FORS) or equivalent standard within 3 months of the *starting date*. The *Contractor* shall ensure that each freight operator or haulier working on this contract is a registered member of (FORS) or equivalent standard prior to appointment on this contract or as a minimum within 3 months of their appointment.

If the *Contractor* does not operate any commercial vehicles he shall become an Associate Member of FORS within 3 months of the *starting date*.

The *Contractor* shall provide evidence upon request that the Freight Operator and Hauliers and other goods vehicle operators are in possession of an up to date operating licence required to operate their class of vehicle. The *Contractor* shall inform the *Project Manager* of any changes to their operating licence, or the driving licences of any of their drivers, including subcontractor's drivers, that impact on their ability to safely and legally operate and drive vehicles as part of the *works*. The *Contractor* shall be responsible for all drivers under their contract, including those employed by Subcontractors, agencies and owner drivers who are contracted to work for them in delivering the *works*.

26.12 Control and Coordination of Vehicle Movements

26.12.1 General

The *Employer* will implement a Traffic Coordination Centre (TCC) to assist in the co-ordination of vehicle movements required for the *works* and other contracts forming part of the Project. This includes providing a Vehicle Movement Planning System (VMPS) and operating the TCC.

26.12.2 The *Contractor's* Responsibilities for the Control of Vehicle Movements

The *Contractor* shall be responsible for the planning and implementation of all vehicle movements associated with the *works*, including those by subcontractors and suppliers, and for ensuring that they meet the requirements of the Works Information.

The *Contractor* shall include in his Logistics Plan his proposals to control all vehicle movements associated with the *works*.

26.12.3 Traffic Coordination Centre

The TCC will operate a central VMPS. The TCC collects and collates traffic information across the Project to assist the *Contractor* and Others with vehicle planning. No action or omission of the TCC nor any inaccuracy in the information that it provides will relieve the *Contractor* of its responsibility to plan and control all the vehicle movements associated with the *works*, including those by subcontractors and suppliers.

The TCC will:

- provide and operate the VMPS which is a Project-wide facility for recording planned and actual vehicle movements;
- liaise with stakeholders and Others to gather key road transport information and advise the *Contractor* on known events which may impact on the vehicle movement planning;
- review and comment on the *Contractor's* vehicle movement plans;

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- assist the *Contractor* in coordinating his vehicle movement plans with those of other Project contractors and Others and identify opportunities for the *Contractor* to minimise his vehicle movements;
- seek to identify any conflicts between the *Contractor's* long range or weekly plans as a result of the plans of other Project contractors or Others to enable the *Contractor* to resolve those conflicts; and
- collate and monitor actual vehicle movements and incidents.

26.12.4 Lorry Holding Areas

Due to restricted road space available at sites and adjoining streets, lorry holding areas are required to assist efficient road transportation control and reduce the risk of congestion.

. Lorry holding areas may be remote from the Site or the Working Areas or within the footprint of the Site in some cases. The *Contractor* shall use the lorry holding areas to receive, hold, and release all vehicles prior to dispatch to the Site and the Working Areas in order to prevent any on-street congestion, waiting, or circulating of the local roads. In using lorry holding areas the *Contractor* shall:

- utilise the VMPS;
- ensure there is sufficient capacity in the lorry holding areas to meet the requirements of the *Contractor's* daily vehicle movement plan and that the lorry holding areas is used in accordance with that plan;
- turn away any vehicle which arrives at the lorry holding area when there is insufficient capacity in the lorry holding areas;
- not call forward or allow a vehicle to leave a lorry holding areas until there is sufficient capacity at the Site for the vehicle to enter the Site;
- allow vehicles from other contractors to use the lorry holding areas as directed by the *Project Manager*;
- respond to the *Project Manager* with a prompt decision if a vehicle arrives at the lorry holding areas which is unplanned or otherwise not in compliance with the daily plan;
- allow the Vehicle & Operators Servicing Agency (VOSA) access to the lorry holding areas to undertake vehicle compliance checks; and
- Act as Principal Contractor under the Construction Design & Management (CDM) Regulations 2007 for lorry holding areas operated by the *Contractor* .

If the *Contractor* fails to ensure compliance which results in congestion or other impacts then the *Project Manager* may instruct the *Contractor* to:

- stop additional vehicles approaching the congested area; and
- send away vehicles waiting to enter the lorry holding areas or already in the lorry holding areas
- If the *Contractor* does not promptly comply with these instructions then the *Project Manager* may stop the *Contractor's* vehicle movements.

In the course of the daily operation of the lorry holding areas the *Contractor's* Logistics Manager and other nominated management and supervisory staff shall liaise frequently with the TCC and lorry holding areas operatives to resolve any conflicts arising from vehicles arriving early, late or not at all at the lorry holding areas. Two-way communication systems enabling the lorry holding areas and the Site and the Working Areas to converse directly shall be provided by the *Contractor*.

26.12.5 Vehicle Movement Planning System

The *Project Manager* shall implement a Vehicle Movement Planning System (VMPS) which will:

- be a centralised system to be used by the *Contractor* and other Project contractors;
- record planned and actual vehicle movements for each lorry holding area, Site and Working Area by timeslot;
- identify individual drivers and will record their driver induction training; and
- monitor and report actual vehicle movements.

The *Contractor* shall populate the VMPS when producing his long range, weekly and daily vehicle movement plans. The information required to populate the VMPS shall include:

- vehicle ID/vehicle registration number;
- Freight Operator or Haulier ;
- Drivers full name and ID (if a frequent lorry driver, this shall be linked to the completion of the lorry driver induction training course);
- confirmation that the infrequent lorry drivers have received the Project driver information pack
- vehicle description – vehicle type and load size;
- point of origin;

- access point to Site or Working Areas;
- lorry holding area arrival time;
- Site or Working Area arrival time;
- estimated dwell time on Site or Working Area (eg for unloading/loading);
- indicative journey times and distances;
- vehicle utilisation, i.e. the proportion of a full load that is delivered;
- loading/unloading duration;
- Site or Working Area departure time;
- abnormal load notification;
- a cumulative assessment of all vehicle movements and their compliance with the Works Information; and
- any other traffic management requirements.

The *Contractor* shall provide to the TCC copies of the gate sheets detailing actual vehicle movements within 2 working days of the vehicle movements.

In addition to the above the VMPS may allow the *Contractor* to record the following information should the *Contractor* wish to do so:

- Company FORS registration number;
- Mileage;
- Load weight; and
- Person entering information into the VMPS.

26.12.6 Vehicle Movement Planning

The *Contractor* shall:

- determine all vehicle movement requirements for the *works*;
- estimate the number of vehicle movements required taking into consideration the requirement to consolidate part loads;
- ascertain from the TCC known future traffic restrictions and constraints;

- liaise with Others, to seek to ensure there are no conflicts between them and the *Contractor's* forecasts which may cause congestion or impact on the *Contractor's* ability to comply with the Works Information.

The *Contractor* shall produce long range, weekly and daily vehicle movement plans for submission to the *Project Manager* and TCC as detailed below:

- Long range plan - At the start of every Project period the *Contractor* shall submit a plan of all vehicle movements required for the following period.
- Weekly plan – By 12:00hrs the Monday of every week the *Contractor* shall submit a plan of all vehicle movements for the following week (i.e. starting 7 days after submission) which shall detail movements on a daily basis.
- Daily Vehicle Movement Plan – By 09:00hrs every day the *Contractor* shall submit a Daily Vehicle Movement Plan for all vehicle movements for the following day (i.e. at start of work the following day) including planned timings, and indicate where this daily plan differs to the weekly look ahead.

These plans shall contain complete and accurate information and shall be both feasible and practicable and shall be submitted using the VMPS.

On receipt of the *Contractors* long range, weekly or daily plans the TCC will:

- collate and review the plans with those provided by Others;
- Seek to identify any potential issues or constraints in the *Contractors* plans;
- Seek to identify any potential conflicts between the *Contractors* plan and plans of Others;
- Identify any potential issues, conflicts or constraints with the *Contractors* plans to the *Contractor* and the *Project Manager*.

The *Contractor*, is responsible for resolving any potential issues conflicts or constraints identified by the TCC or Others

If on receipt of the *Contractor's* Daily Vehicle Movement Plan by the TCC the *Contractor* has resolved all conflicts such that it is not envisaged that the proposed Daily Vehicle Movement Plan would cause congestion, the *Project Manager* may issue, via the TCC, a non-objection communication to the *Contractor* . On receipt of a non-objection communication to a Daily Vehicle Movement Plan the *Contractor* shall remain responsible for implementing that plan and the impact of any foreseen or unforeseen incidents on that plan.

If on receipt of the *Contractor's* Daily Vehicle Movement Plan the *Contractor* has not resolved all conflicts such that the proposed Daily Vehicle Movement Plan might cause congestion the *Project Manager* may issue, via the TCC an objection communication to all or part of the *Contractor's* Daily Vehicle Movement Plan. The *Contractor* shall not implement that part of the Daily Vehicle Movement Plan to

which the *Project Manager* has objected. If the *Contractor* does not modify his Daily Vehicle Movement Plan to remove a conflict the *Project Manager* may prohibit the operation of that part of the plan and the *Contractor* will be held liable for any cost incurred as a result.

The *Contractor* shall ensure that all vehicles visiting or leaving the Site or the Working Areas are planned and entered in to the VMPS.

26.12.7 Contingency Planning

As part of its Logistics Plan, the *Contractor* shall produce a road transport contingency plan prior to commencing any major vehicle movements.

26.12.8 Not Used

26.12.8A Abnormal Indivisible Loads

An abnormal indivisible load is defined in the Road Vehicles (Authorisation of special types) (general) order 2003.

Legislation requires hauliers to notify the movement of most abnormal indivisible loads and abnormal vehicles to the police before moving them by road. There is also a requirement to notify heavier loads and vehicles to highway and bridge authorities to ensure that bridge structures can accommodate these heavy loads.

26.12.8A.1 Lorry Controls

The *Contractor* shall ensure that when any vehicle or item of equipment is reversing within the site, on or adjacent to a highway open to traffic, it does so only under the supervision of a person designated and trained for the purpose of regulating traffic within the site who shall be readily distinguishable from the remainder of the work force

The *Contractor* shall display signs in a prominent position on vehicles on public roads which are dedicated to the Project. The signs shall uniquely identify the vehicle to Crossrail

26.12.9 Not Used

26.13 Vehicle Security

The *Contractor* shall be responsible for the security of all Equipment, Plant and Materials, vehicles and drivers whilst in transit or at the Site.

The *Contractor* shall develop and implement a Vehicle Security Plan as part of the Logistics Plan for the *works*. The Vehicle Security Plan will set out how the legal and contractual requirements shall be managed in accordance with the Works Information and must clearly identify measures to ensure the security of the load being transported, vehicles and drivers. The plan shall include the nominated persons responsible for each task.

The *Contractor* shall undertake vehicle security searches. All vehicle security searches must be recorded and the details forwarded to the *Project Manager* and TCC. Any security breach in relation to vehicle movements or this part of the Works Information must be reported immediately to the *Project Manager* and the TCC.

Planned and controlled security screening of vehicles may also be undertaken at the lorry holding area and Sites by the *Project Manager* or other authorised bodies.

Particular attention should be made to the requirements detailed in Part 16 Security of Volume 2B of the Works Information.

26.14 Vehicle Safety Equipment Standards

26.14.1 General

This section details the *Employer's* vehicle safety equipment requirements. These requirements are in addition to those required by legislation.

The *Contractor* shall be responsible for ensuring all his vehicles and drivers and those of subcontractors and suppliers transporting Equipment, Plant and Materials and people to and from the Site and the Working Areas comply with this section of the Works Information.

Any vehicle or driver that does not meet the required standard shall not be allowed to enter or deliver Equipment, Plant and Materials or people to the Site or Working Areas or lorry holding area. The *Contractor* will be held liable for any costs resulting from vehicle being turned away from the Site or Working Area or lorry holding areas for failure to comply with these requirements.

Abnormal Indivisible Loads are exempt from the requirements of this section subject to the *Contractor* taking all appropriate measures to ensure the vehicles are operated in a safe manner. In addition the *Contractor* must document what measures have been taken and submit this to the *Project Manager* at least 7 days prior to the vehicle commencing its journey.

26.14.2 Not Used As part of his Logistics Plan the *Contractor* shall develop and implement arrangements and processes to ensure compliance with this section of the Works Information.

26.14.3 Minimum Safety Equipment Requirements for all Vehicles

The *Contractor* shall ensure that all vehicles used to transport Equipment, Plant and Materials and people to and from the Site and the Working Areas will be equipped with operating the mandatory safety equipment listed below:

- seat belts (for the driver and all passengers riding in vehicles used to transport multiple individuals);
- rear-view mirrors;
- reversing sensors/alarms/cameras;

- lights (head & tail, stop, turn signal, and emergency warning);
- reflective warning triangle (portable emergency warning);
- signage: maximum number of passengers (buses and other similar vehicles only);
- seat belt, inspection and Drug and Alcohol warning decal;
- light and high-visibility colours for vehicles;
- daytime running lights;
- no additional window tinting;
- backup alarms –where applicable;
- fire extinguishers;
- flashing lights (construction vehicles) – this requirement applies only to vehicles which enter Security Zone 2 and/or Security Zone 1. For vehicles which do not enter Security Zone 2 and/or Security Zone 1 the *Contractor* must assess whether the vehicle requires flashing lights to be fitted, this assessment will include a *Contractors* risk assessment;
- spare light bulb kit; and
- fog lights.

26.14.4 Mobile Batching Plant

Mobile batching plant vehicles which are classified as “engineering plant” may be exempt from certain regulations. Mobile batching plants represent a serious danger to vulnerable road users and the *Contractor* shall not use a mobile batching plant to deliver any part of the *works* without the prior acceptance of the *Project Manager*. In requesting acceptance the *Contractor* shall be required to demonstrate that the mobile batching plant meets the safety standard expected of a Large Goods Vehicle and the Works Information and:

- complies with the operator licensing arrangements required for goods vehicles;
- is fitted with a tachograph;
- complies with The Road Vehicles (Construction and Use) Regulations and in particular the axle and weight limits specified those regulations;
- that the vehicle will not be overloaded and not be loaded greater than 32 tonnes; and
- that the vehicle has a current Large Goods Vehicle M.O.T. certificate.

26.14.5 Communication Equipment in Vehicles

The *Contractor* shall ensure that the use of communications equipment by drivers will be prohibited in all vehicles whilst moving, including those of subcontractors and suppliers. This includes:

- mobile hand held devices;
- mobile hands free devices;
- CB radios; and
- hand held transmitters.

26.14.6 Additional Safety Equipment Requirements for Specific Vehicle Types

The vehicle safety equipment set out below is the minimum standard to be implemented by the *Contractor* when combined with Crossrail's Lorry Driver Induction Training will assist in reducing the risk of a serious collision occurring between a vehicle and vulnerable road user such as a cyclist, pedestrian or powered two wheeled vehicle. The equipment listed represents best practice in the construction industry and is in use daily by transport companies and contractors as part of their on going corporate social policy and attitude towards work related road safety.

This equipment includes:

- blind spot mirrors;
- fresnel lenses;
- rear warning signs for cyclists and pedestrians;
- side under-run guards; and
- side-scan side detection warning systems.

Table 26.1 lists the main types of vehicles which will be used in delivering the *works* and the minimum additional safety equipment to be fitted to those vehicles.

26.14.7 Blind Spot Mirrors

All vehicles over 7.5 tonnes must be fitted with class IV and V Mirrors under the 2003 EU (retrofit) and 2007/38/EC for new vehicles. All mirrors must be cleaned daily and correctly adjusted.

In addition to statutory requirements the *Contractor* shall ensure all vehicles specified in Table 26.1 are fitted with Class VI mirrors to give a view of the roadway directly in front of the drivers cab; these mirrors have been proven to reduce collisions with cyclists and pedestrians.

26.14.8 Fresnel Lenses

The *Contractor* shall ensure that a Fresnel lens is fitted on all vehicles as specified in Table 26.1.

For additional information on the use, benefits and fitting of a Fresnel lens please refer to the Transport Research Laboratory Published Project report PPR 43 “Follow up study to the heavy goods vehicle blind spot modelling and reconstruction trial” published in May 2009.

26.14.9 Rear Warning Signs for Cyclists & Pedestrians

It is currently a statutory requirement for all vehicles over 7.5 tonnes to have warning signs fitted to the back of the vehicle stating the overall length.

In addition to statutory requirements the *Contractor* shall ensure that warning signs are fitted on the back of vehicles as specified in Table 26.1, alerting cyclists to the dangers of undertaking heavy goods vehicles. For articulated vehicles, mention shall also be made of the length of the vehicle to illustrate additional dangers as the vehicle moves round corners.

For pedestrians the *Contractor* shall ensure that warning signs are fitted on the sides of HGVs at the front nearside warning about walking close to the front of a moving or stationary lorry.

26.14.10 Side Under-run Guards

The *Contractor* shall ensure that vehicle side under-run guards are fitted on all vehicles as specified in Table 26.1. The guards must fill the space between the front and rear axles.

In addition to the above the *Contractor* shall install side under-run guards as standard to all 4, or multi axle, tippers (including grab lorries) unless the *Contractor* can provide evidence from the original equipment manufacturer that fitting of such equipment is not practicable. The *Contractor* shall review this requirement every period.

Road sweepers are exempt from the requirements of this clause

26.14.11 Sidescan side detection and warning systems

The *Contractor* shall ensure that a sidescan side detection and warning system is fitted on all vehicles as specified in Table 26.1. This shall detect anyone in the vehicles blind spot warning them that the vehicle is about to turn whilst also warning the driver.

For tractor and trailer type vehicles the trailer is exempt from the requirements of this clause, the tractor must comply.

26.14.12 Vehicle Safety Equipment Requirements Matrix

Equipment Vehicles	Blind Spot Mirrors Class IV, V and VI	Fresnel Lenses	Rear/Side Warning Signs	Side Under-run Guards	Side scan detection and warning systems
Vans < 3.5 T			<input checked="" type="checkbox"/>		
Small lorries 3.5 to 7.5 T	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Medium to Large Lorries >7.5 T	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Concrete mixer (6 m ²)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2/3 Axle rigid	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Grab Lorry	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	See 26.11.9	<input checked="" type="checkbox"/>
4 or multi Axle tippers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	See 26.11.9	<input checked="" type="checkbox"/>
Articulated low loader	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Table 26.1 – Vehicle Safety Equipment Requirements Matrix

26.15 Appendices

Appendix 26A – Logistics Plan Template

Learning Legacy Document

Part 27 – Systems Integration

27.1 Introduction

This Part provides a summary of the *Employer's* approach to Systems Integration, it describes the processes that the *Employer* intends to utilise to ensure that an operational railway is delivered that meets the *Employer's* requirements.

Systems Integration within the Project is defined as the integration of all the Crossrail railway systems, electrical and mechanical systems and the civil infrastructure together with the rolling stock and operations and maintenance processes to deliver a resilient operational railway that meets the *Employer's* requirements.

The *Employer* is responsible for the overall management of Systems Integration, The Systemwide and Commissioning Director manages overall integration on behalf of the *Employer*.

Both the *Employer* and the *Contractor* monitor and proactively manage Systems Integration to ensure that the interfaces are consistent and deliver the *Employer's* requirements.

27.2 Systems Integration organisation

To support Systems Integration a number of processes and forums have been set up to facilitate and enforce integration.

Each element of the System Integration hierarchy is described below and the overall relationship is described below in Diagram 1.

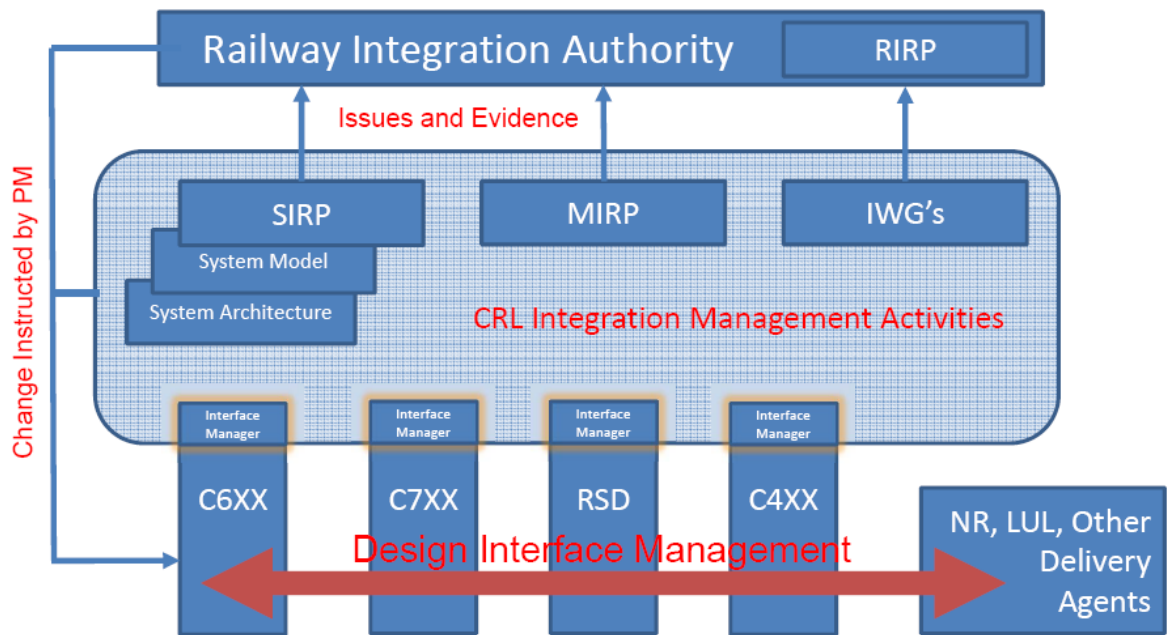


Diagram 1: System Integration Activities

27.2.1 Railway Integration Authority

The *Employer* has established the Railway Integration Authority (RIA)

The RIA is chaired by the Systemwide & Commissioning Director and is formed of representatives of the Systemwide & Commissioning Director, the Industry Partners, the maintainers and the operators.

The RIA remit is to:

- Seek assurance that the configuration of the rail systems, rolling stock and infrastructure combined with operations and maintenance inputs delivers a safe and resilient operational railway that meets the Employer's Requirements.
- Maintain the integrity of the requirements and resolve integration related issues that might arise between contractors, or contractors and Others such as Industry Partners, acting as a 'back stop' forum for issues that collectively impact on the railway.
- Review Systems Integration issues.

The RIA assesses the impact of System's Integration issues and endorses decisions as to the best way forward, thereafter monitoring progress to successful conclusion.

The RIA does not in itself act as an assurance body, though it can support the needs of assurance through generating evidence of integrated safety, performance, operability and maintainability.

27.2.2 System Integration Review Panel (SIRP)

The Systems Integration Review Panel (SIRP) has been established by the *Employer* as a working panel formed of representatives of the Systemwide and Commissioning Director and the operators. The purpose of the SIRP is to maintain the alignment between the *Employer's* requirements, the *Employer's* Operations Concept and the design through a structured workshop process.

The SIRP functions under the governance and overall direction of the RIA.

27.2.3 Maintenance Integration Review Panel (MIRP)

The Maintenance Integration Review Panel (MIRP) has been established by the *Employer* as a working level panel formed of representatives of the Systemwide and Commissioning Director and the maintainers.

The role of the MIRP is to provide a review of the specifications and designs against the Infrastructure Manager's maintenance plans in order to maintain consistency between the methods, planning and logistics of maintenance and the railway as designed and built.

The MIRP functions under the governance and overall direction of the RIA.

27.2.4 Interface Working Groups

The Interface Working Groups (IWGs) are technical discipline meeting panels established to provide a geographically based locus so that the *Employer* can gain agreement with the Infrastructure Managers regarding Design Demarcation Boundaries, Interface Requirement Specifications and Detailed Interface Requirements. The nine Interface groups are as follows:

- Non-Traction Power
- Rolling Stock
- Operating Rules and Principles
- Traffic Management and Regulation
- Telecoms and Information Systems
- Route Control Centre / Back-Up Control Facility
- Infrastructure South East
- Infrastructure East
- Infrastructure West

The working groups come under the governance of a joint interface steering group which reports progress and critical risks to the RIA.

27.3 Systems Integration processes

27.3.1 Railway Integration Review Points

Railway Integration Review Points (RIRP) have been established as the key tool of the RIA to evaluate the progress of integrated configuration of the collated elements of Crossrail railway at key points in the programme.

Each RIRP assessment seeks to confirm the following:

- The *works* will deliver the overall performance as per the current *Employer's* requirements baseline
- The *works* are baselined against the current *Employer's* Operations Concept and maintenance plans.
- The *works* and relevant assurance evidence have reached the anticipated standard of development.
- The interfaces between the various *works* are 'complete' and developed to an anticipated standard of development.

The Railway Integration Review Points are not "stop/go" gates. The aim is to review the status of the Programme and identify new integration risks, and agree any recovery actions.

This process shall not rely on the generation of any bespoke evidence from the *Contractor*, however it will reflect the *Contractor's* output.

The evidence shall collectively demonstrate the progress and quality of works against standards (previously endorsed by the RIA) and identify specific risks or issues for addressing.

27.3.2 System Architecture Drawings

The *Employer* has developed a series of system architecture drawings, based on the reference designs which diagrammatically represent the railway, showing the various systems and their interfaces.

The System Architecture Drawings provide a means for visualising and controlling the configuration of the railway.

27.4 Contractor's Obligations

The Contractor's obligations in regard to the interface and integration process are further detailed in other sections of this Works Information and the contract.

Part 28 – Testing and Commissioning Process

28.1 Scope

This testing and commissioning process document applies to the following elements of the Project:

- Systemwide works
- Mechanical and electrical (M&E) works in stations
- Mechanical and electrical (M&E) works in intermediate shafts
- Mechanical and electrical (M&E) works at portals

The objective of the testing and commissioning process is to progressively set to work the Elementary Systems, Sub-systems and Commissioning Lots of the Project in a manner which ensures safe operation at all times, and demonstrates to the satisfaction of the *Employer* that the *works* relevant to a particular contract meets the requirements of the Works Information and the requirements of all relevant legislation, so as to enable the *Employer* to obtain authorisation to enter into passenger service. The Elementary Systems, Sub-systems and the like referred to above are as described in the relevant sections of the Works Information.

28.1.1 Not Used

28.1.2 Testing and commissioning phases

Testing and commissioning of the *works* will be undertaken in 5 phases. The 5 phases of testing are:

- Phase 1: Factory acceptance tests,
- Phase 2: Tests of the installation of each major component of a Sub-system or Elementary System
- Phase 3: Static Integration Tests performed on components of a Sub-system or Elementary System
- Phase 4: Dynamic Tests performed on Elementary Systems acting together as a whole
- Phase 5: Trial Running.

28.1.3 Summary of *Contractor's* Responsibilities

All contractors employed by the *Employer* to construct stations, portals, intermediate shafts, systemwide systems and the like are responsible for carrying out the testing and commissioning activities in accordance with this testing and commissioning process from Phases 1 to 5 (inclusive as appropriate to their own systems). In carrying out the testing and commissioning activities the *Contractor* shall coordinate with the works of Others including, External Facility Networks, Network Rail, Docklands Light Railway and London Underground Limited, persons appointed under R(I)R and ROGS, the ORR, HSE, local authorities, and all other regulatory bodies.

The *Contractor* shall produce a "Testing and Commissioning Plan" to describe the testing and commissioning activities to be undertaken.

Where designated as Principal Contractor pursuant to the CDM Regulations 2007, the *Contractor* shall also be responsible for coordinating the testing and commissioning work of Others within the Site and/or the Working areas for which he is responsible.

For testing and commissioning under Phases 4 and 5, the *Employer's* C610 Systemwide Main Works contractor will lead the testing and will provide overall coordination and management of the testing and commissioning activities in accordance with his "Systemwide Commissioning Plan". The *Contractor* shall comply with the appropriate "Systemwide Commissioning Plan" and cooperate with the C610 Systemwide Main Works contractor to enable him to discharge his own testing and commissioning responsibilities.

28.1.4 Liaison with Others

The *Contractor* shall liaise with Others as necessary to ensure that all the constraints and requirements of the *Employer*, External Facility Networks, railway networks of Network Rail, Docklands Light Railway and London Underground Limited., persons appointed under R(I)R and ROGS, the ORR, the HSE, local authorities and other regulatory bodies are met in accordance with the Accepted Programme.

28.1.5 Organisation

The *Contractor* shall ensure that the *Contractor's* commissioning teams have the appropriate qualifications, competence and experience, and are in sufficient numbers for the workload proposed in the Testing and Commissioning Plan, including their responsibilities for managing and co-ordinating the interfaces with External Facility Networks, Railway Networks of Network Rail, Docklands Light Railway and London Underground Limited., persons appointed under R(I)R and ROGS, the ORR, the HSE, local authorities and other regulatory bodies and the *Employer*.

28.1.6 System Breakdown (into Sub-systems and Commissioning Lots)

The *Contractor* shall break down his systems into Commissioning Lots, commission each of those, then gradually commission between these units to enable the *works* to be commissioned. The functioning units are referred to as Commissioning Lots and the *Contractor* shall identify and complete all tests necessary to demonstrate that each of his Commissioning Lots, Sub-systems and systems meet the requirements specified and fulfil their functionality as described in the Works Information.

28.1.7 Programming

The *Contractor* shall produce the Test and Commissioning Logic linking together the various activities in a logical manner ensuring that the sequence and interdependences of all activities are recognised.

When the Commissioning Logic is established, each test activity shall be given an estimated duration and appropriate resource allocation. By analysing the results and carrying out a number of reconciliations to decide on the optimum numbers of, inter alia, personnel, test sites, items of Plant and Materials, the Commissioning Logic is converted into the “Commissioning Schedule” which shall form part of the programme to be submitted to the *Project Manager* for acceptance.

The *Contractor* ensures that the Commissioning Schedule of his works is integrated with the requirements of Others and the requirements of *the Employer*.

The *Contractor* issues to the *Supervisor*, and the *Project Manager* information that shows the degree of progress made on a 4 weekly basis.

28.2 Implementation of Testing and Commissioning

28.2.1 General Requirements

Throughout the five phases of the testing and commissioning process the *Contractor* shall:

- ensure the integrity of all Plant and Materials, infrastructures, Sub-systems and Elementary Systems tested by the *Contractor* are verified by the *Contractor* before it proceeds with subsequent phases or sub-phases of testing and commissioning;
- ensure access is controlled by the relevant Principal Contractor for the areas for which it is responsible to prevent any alteration or damage to any parts of infrastructure including the tested plant and materials and all systems;
- notify, on a timely basis, the *Supervisor*, the *Project Manager*, the *Employer* and all relevant Others including, Network Rail, Docklands Light Railway and London Underground and the External Facility Networks of their testing and commissioning interface requirements;

- ensure that all test plans are submitted to and accepted by the *Supervisor*, *Project Manager*, and any relevant Others in advance of the commencement of any test;
- provide a “Testing and Commissioning Plan” detailing all tests which it is required to carry out for Phases 1 to 5 (inclusive) of the Testing and Commissioning, together with the methods by which such tests will be recorded;
- identify to the *Project Manager* all areas outside of the *boundaries* of the Site to which he requires access to carry out testing and commissioning and the *Contractor* shall make all the necessary arrangements to obtain such access in a timely manner to ensure that the programme for acceptance is maintained;
- in addition to the requirements stated in paragraph 28.1.7, develop a detailed programme (including the Commissioning Logic and Commissioning Schedule) for the testing and commissioning process and co-ordinate and manage proactively the interfaces with the *Employer*, and all relevant Others, including the railway networks of Network Rail, Docklands Light Railway, London Underground, and the External Facility Networks to ensure that the testing and commissioning is completed in accordance with the Accepted Programme, the *Contractor’s* Testing and Commissioning Plan and the Works Information; and
- provide documents and information as necessary or appropriate to enable the *Employer* to prepare deliverables such as the project safety case.

The *Employer*, Others nominated by the *Employer*, the *Project Manager*, the Supervisor, persons appointed under R(I)R and ROGS, HSE and the ORR shall be entitled at all reasonable times during manufacture to inspect examine and witness tests. Such inspection, examination or witnessing of tests shall not release the *Contractor* from any obligation under this contract.

The *Project Manager* shall be entitled to order the cessation of any test if damage to any part of the property of the *Employer* or of Others including the railway networks of Network Rail, Docklands Light Railway, London Underground and the External Facility Networks infrastructure or personal injury is likely to result from continuation.

28.2.2 Testing and Commissioning Phasing

The testing and commissioning phases will be applied appropriately to all Elementary Systems of the *works* and all associated interfaces. The phases 1 to 5 testing will be performed in accordance with specific test procedures prepared by the *Contractor* in order to prove that the Sub-systems and systems meet the requirements of the Works Information in terms of functionality, performance, capacity, safety and fitness for purpose.

The 5 phases of testing are as depicted in figure 28.1 below:

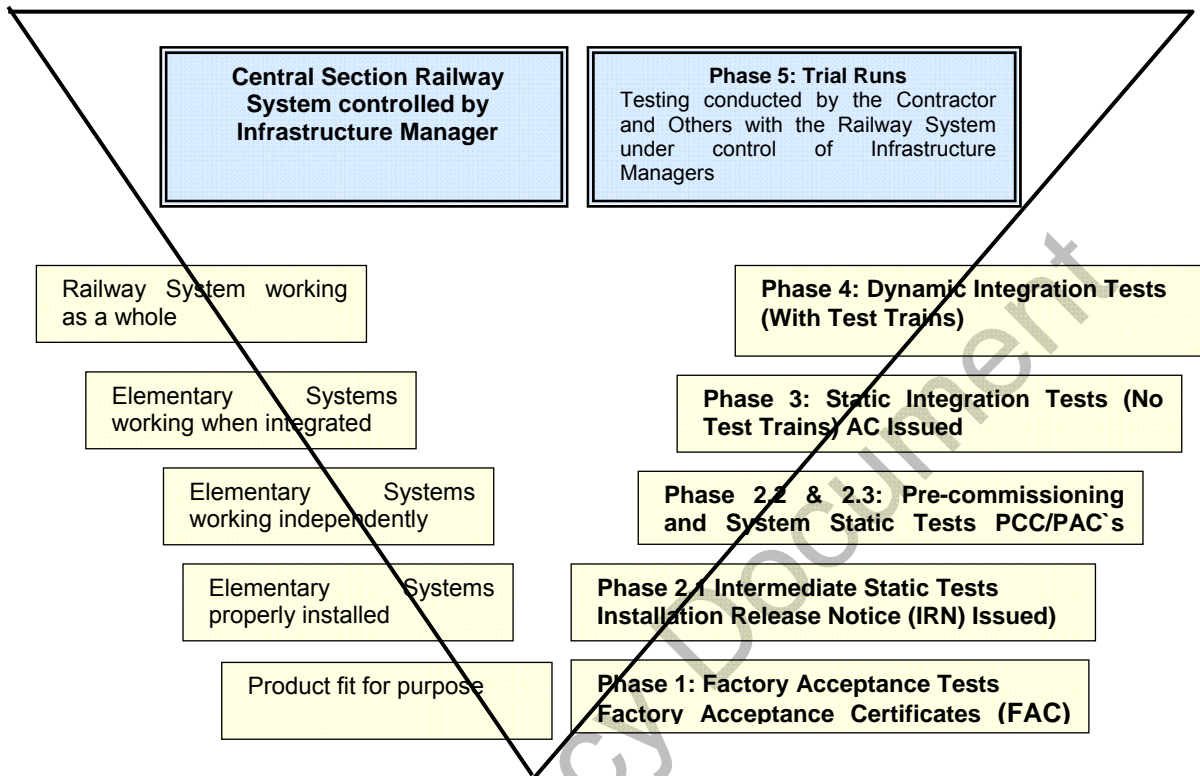


Figure 28.1 - Key:

FAC: Factory Acceptance Certificates
 IRN: Installation Release Notice
 PCC: Pre-Commissioning Certificate
 PAC: Partial Acceptance Certificate
 AC: Acceptance Certificate

28.2.2.1 Phase 1 - Factory Acceptance Tests

Factory acceptance tests (FATs) shall be satisfactorily completed by the *Contractor* before shipment to the Site and/or the Working Areas of any item of Plant and Materials in order to verify that it and its components are fit for its or their intended use and otherwise comply with the Works Information. The factory acceptance tests are carried out by the *Contractor*, and in accordance with the *Contractor's* accepted method statements, quality plan and test procedures.

28.2.2.2 Phase 2 - Static Tests

28.2.2.2.1 Phase 2.1 Intermediate Static Tests per Sub-System

Intermediate Static testing is the first step of the Static Tests. The objective of the tests is to verify that the Plant and Materials have been constructed and installed in accordance with the contract requirements and that the next sub-phase of 2.2 Static Tests per Elementary Systems can start without damaging any part of the *Employer's* infrastructure, the railway networks of Network Rail, Docklands Light Railway, Others and London Underground, or the External Facility Networks.

For example, circuit continuity and insulation resistance will be tested during these tests.

The phase 2.1 intermediate Static Tests will also verify that the Plant and Materials have been constructed and installed properly so that they do not adversely affect or impede the proper functioning of all other systems.

During this phase, neither the systems nor their components shall be energised.

Satisfactory completion of this phase of testing by the *Contractor* results in the issue of the IRN for the individual Commissioning Lot.

28.2.2.2.2 Phase 2.2 Static Tests per Elementary System

In this phase the components or Sub-systems will be energized and the *Contractor* shall ensure that the Plant and Materials function properly in accordance with the Works Information.

The objective of the tests is to verify that the Sub-systems work on an integrated basis. The phase 2.2 tests shall be undertaken when all Sub-systems that comprise a system are connected. These tests will be carried out for each Elementary System.

Interfaces between the different systems involved will be tested by simulation only as at this stage the systems are not connected with each other.

The completion of this stage must give confidence to all interested parties that the installed system or systems functions correctly as designed.

28.2.2.3 Phase 3: Static Integration Tests

Static Integration Tests are undertaken when the interfaces between Elementary Systems, including the interfaces with systems provided by Others, including Network Rail, Docklands Light Railway, London Underground, and External Facility Networks are fully connected. The objectives and description of the tests are the same as those specified in "Static Tests per Elementary System".

The *Contractor* shall carry out any tests required by the Employer and Others to commission their interfaces, including the Network Rail, Docklands Light Railway, London Underground, and External Facility Networks.

The *Contractor* shall cooperate and coordinate with Others as required to support testing of the interfaces and integration with other systems when interface and integration testing is carried out by Others.

The *Contractor* shall take into account the operational constraints of relevant Others including Network Rail, Docklands Light Railway, and London Underground, or External Facility Networks, HSE or the ORR that may constrain and preclude flexibility in implementing the testing and commissioning process. The *Contractor* includes such operational constraints in the Contractor's Testing and Commissioning Plan.

The *Contractor* shall provide its requirements for Phase 4 and 5 to the *Project Manager*, and relevant Others including, Network Rail, Docklands Light Railway, and London Underground, or External Facility Networks, HSE and the ORR as necessary on a timely basis prior to the end of Phase 3 testing.

28.2.2.4 Phase 4 - Dynamic Tests

The *Employer's* C610 Systemwide Main Works contractor will lead and co-ordinate Dynamic Tests with Test Trains provided by the *Employer* in accordance with its CCRRB.

The *Contractor* shall support the *Employer's* C610 Systemwide Main Works contractor in delivering the tests and will test and commission its systems according to the *Employer's* C610 Systemwide Main Works contractor's testing and commissioning plan with due consideration to the *Employer's* C610 Systemwide Main Works contractor's operational requirements and in accordance with the CCRRB.

The purpose of the Dynamic Tests will be to verify that the *Contractor's* design and installation of the Plant and Materials and systems comply with the Works Information, and that all system interfaces function and are integrated so that the overall railway system operates as required and safely.

28.2.2.5 Phase 5 - Trial Running Tests

Trial Running tests will be led and co-ordinated by the *Employer's* C610 Systemwide Main Works contractor under the Infrastructure Manager's Rule Book and Safety Management Systems. During this phase the Project infrastructure will be operated by the Infrastructure Managers.

The *Contractor* shall support the C610 Systemwide Main Works contractor in delivering the tests and will test and commission his systems according to the *Employer's* C610 Systemwide Main Works Contractor's testing and commissioning plan with due consideration to the C610 Systemwide Main Works contractor's operational requirements and in accordance with the Infrastructure Manager's Rule Book and Safety Management System, or the CCRRB if so notified by the Project Manager.

The purpose of the tests is to demonstrate the stability, capacity, overall performance and compliance with other relevant requirements of the Works Information and the sponsors' requirements for the central section infrastructure.

On completion of phase 5 testing, the operators will conduct Trial Operations to prepare for and demonstrate that they are capable of operating the railway in accordance with the sponsors' requirements and the Operators' Safety Management Systems. The *Contractor* shall support the requirements of the Infrastructure Managers in this phase as necessary.

28.3 Testing and Commissioning Documentation

28.3.1 General

The *Contractor* shall produce the following testing documentation:

- Testing and Commissioning Plan per Elementary System, including:
 - Commissioning Test Descriptions; and
 - Test Data Sheets;
- Test Plans per sub-system;
- Test Procedures;
- Calibration Certificates;
- Test Reports; and
- Certificates.

28.3.2 *Contractor's* Testing and Commissioning Plan

The *Contractor* shall prepare and update as necessary a Testing and Commissioning Plan in compliance with this testing process and the requirements of the Works Information. The plan shall be submitted by the *Contractor* for acceptance by the *Supervisor* in accordance with the Accepted Programme.

The *Contractor's* testing and commissioning plan, test procedures and any other procedures, method statements, forms, certificates, test reports, and any other documents relating to testing and commissioning shall:

- be complete, adequate and suitable for the purposes of enabling the *Employer* to obtain authorisation to enter into passenger service;
- comply with this contract including the Works Information;
- take into account the requirements and constraints of Others, including the External Facility Networks, and all other railway networks; and
- comply with the *Employer's* procedures.

The plan shall include commissioning test descriptions and test data sheets, as described below.

28.3.3 Commissioning Test Descriptions

The commissioning test descriptions shall be included in the *Contractor's* Testing and Commissioning Plan. An individual commissioning test description is issued for each of the Elementary Systems for which the *Contractor* is responsible.

These descriptions include, as a minimum, the following:

- a definition of the scope of testing;
- a list of the tests (title and number) in each phase of the *Contractor's* testing and commissioning;
- a logic sequence diagram;
- a programme for the activities;
- the principal requirements for each test, (including the acceptance criteria to be achieved for a test to be considered successful); and
- a set of test data sheets.

If necessary, the commissioning test descriptions can be split into commissioning implementation plans to suit the needs of each phase.

28.3.4 Test Data Sheet

A test data sheet (one page) shall be provided by the *Contractor* for each test and includes, as a minimum, the following:

- title and number of the test;
- phase and sub-phase of Testing and Commissioning;
- brief description of the test;
- objective of the test;
- location;
- duration;
- requirements regarding items such as equipment, staff, facilities;
- requirements in the form of availability of other Project assets;
- acceptance criteria; and
- any additional comments such as whether any tests have to be repeated.

The test data sheets are a basis for developing the Test Plans which ensure, as a minimum, that the information required on a test data sheet will be available from a particular test as it is implemented in accordance with the relevant Test Plan.

Test data sheets are not required for phase 1, Factory Acceptance Tests.

28.3.5 Test Plans

The *Contractor* shall produce Test Plans for each Sub-system throughout the sub-phases and phases of testing and commissioning.

The *Contractor* takes into account in the Test Plans the requirements and constraints of Others including Network Rail, Docklands Light Railway, London Underground, and the External Facility Networks.

The Test Plan shall specify, as a minimum, the following:

- Objective of test and reference to specifications or design requirement;
- requirements for, *inter alia*, equipment including measuring and calibration devices, rolling stock, communications, staff, subcontracts, specific operational procedures and the like;
- safety procedures;
- test developments;
- associated risks;
- results expected;
- acceptance criteria; and
- format for recording the test.

The Test Plans for tests involving several systems provided by several contractors will be prepared by the “lead test contractor” and accepted by the relevant Others.

28.3.6 Test Reports

Each test report shall include the relevant Test Plan with the test results, and the resultant analyses and conclusions. Results and records of each test will be carefully analysed by the *Contractor* and a final conclusion drawn.

Tests repeated on identical assemblies or Sub-systems can be compiled in one test report but with all test records included.

For Factory Acceptance Tests, the *Contractor* shall determine and propose to the *Project Manager* where he considers that reference to applicable standards may be sufficient to replace a test procedure.

Throughout Phases 1 to 5 (inclusive) of testing and commissioning, the *Contractor* is responsible for compiling and submitting test reports in a timely fashion for acceptance by the *Supervisor*.

28.3.7 Certificates

Factory Acceptance Certificates, Pre-commissioning Certificates, Partial Acceptance Certificates and Acceptance Certificates shall be issued by the *Contractor* in a timely fashion for each concerned Sub-system, system or the *works* to record the successful completion of the tests and to record that all relevant documentation has been provided and accepted by the *Project Manager*.

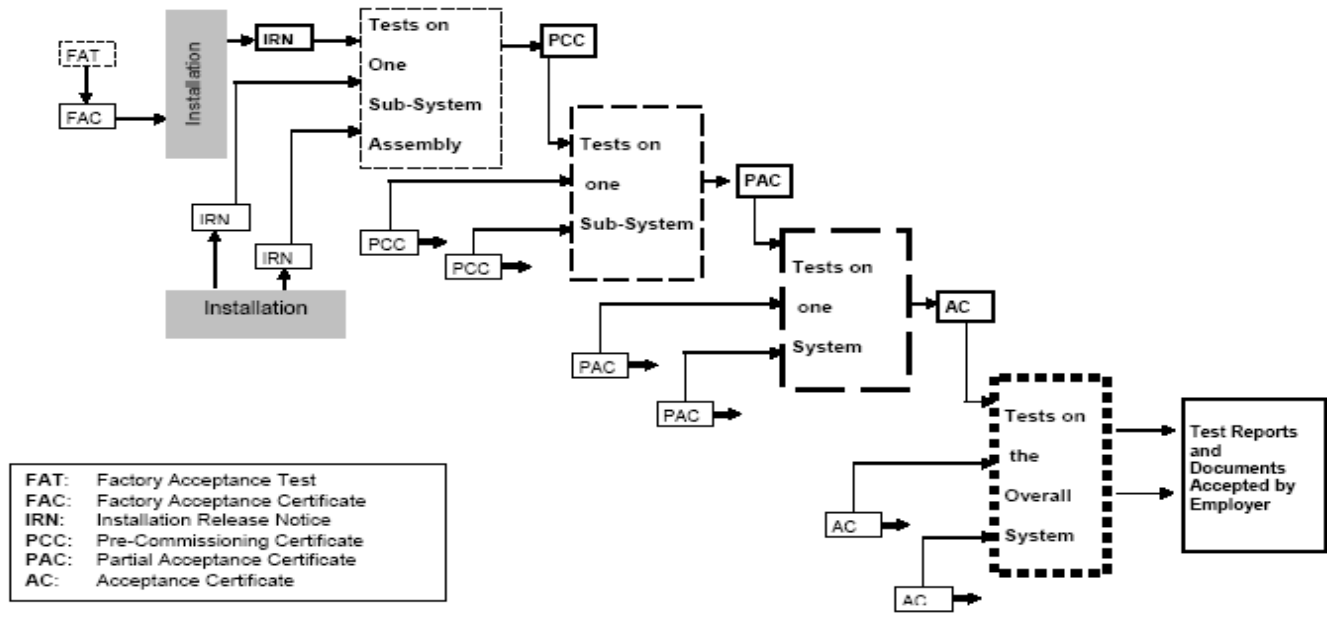
For a given system, the subsequent testing phase shall commence only when the applicable certificate for the preceding phase has been issued.

When “Acceptance Certificates” have been issued for all Elementary Systems and accepted by the *Supervisor*, Phase 4 - Dynamic Tests will commence.

The following diagram (Figure 28.2) depicts the testing and commissioning certification requirements and process of issuing them by the *Contractor*.

Learning Legacy Document

Figure 28.2 Testing & Commissioning Certification



Document uncontrolled once printed. All controlled documents are saved on the CRL Document System

28.4 Measurements

The *Contractor* shall carry out all tests and all measurements in compliance with the relevant norm, standard, specification and requirements of the Works Information.

All specific testing, measuring or recording equipment required during the testing and commissioning process shall be provided, operated and maintained by the *Contractor* throughout Phases 1 to 5 (inclusive) of testing and commissioning.

All instruments shall be calibrated by the *Contractor* in accordance with the relevant British Standard (or the equivalent standard). The *Contractor* shall produce calibration certificates delivered by qualified laboratories. Certificates shall be valid for the shorter of the following two periods – either that which is specified by the relevant British Standard (or the equivalent standard) or that which is specified in the Works Information. (if any) No certificate shall be valid for more than one year.

The *Contractor* shall maintain an inventory of all measuring instruments including make, model, serial number, identification number, date of last and next calibration.

No instrument shall be made available or used on the Site and/or the Working Areas by the *Contractor* without a valid certificate. The *Contractor* shall ensure that they are able to produce a valid certificate at any time as required by the *Supervisor* and/or the *Project Manager*.

These requirements are applicable to measurements carried out by any Subcontractors or suppliers of any tier.

Records of the *Contractor's* measurements shall include:

- date and time;
- detailed description of the whole measuring system: transducers, filters, recorders and the like
- make, model, serial number, date of calibration and identification number for each instrument used;
- instrument settings.

Recorded data shall include a hard copy available immediately at the end of the test, and an electronic copy record enabling processing of recorded data except where the medium does not allow a satisfactory replay of the original data.

28.5 Controls

28.5.1 Room Availability

At all times, the *Contractor* shall control each location for which he is responsible and ensure that the Plant and Materials, systems and the works of Others, including the railway networks of Network Rail, Docklands Light Railway, London Underground, and External Facility Networks and those of the *Employer* are not damaged.

The *Contractor* shall provide a room availability procedure, which will describe in detail the different levels of cleanliness and environmental conditions for those responsible for ensuring that the rooms or enclosures are kept available.

28.5.2 Installation Release Notice

The Installation Release Notice (“IRN”) is a document issued by the *Contractor* certifying adequacy of the installation and formalising the transfer, within the *Contractor’s* team or to Others of responsibility for part of a system (Commissioning Lot) from installation through to testing to commissioning. Prior to any test being carried out on a Commissioning Lot, installation has to be completed on the part of the system concerned and an IRN issued.

In order to verify the proper installation of a Commissioning Lot, intermediate Static Tests (the first stage of Phase 2) are carried out to confirm that Plant and Materials, components, sub-assemblies and assemblies have been installed in a manner which meets the requirements of the Works Information. Satisfactory performance of installation as checked by Intermediate Static Tests and agreed to by both the commissioning and installation teams leads to each IRN submission.

Circumstances may arise when certain items of Plant and Materials are not available for installation or have suffered some damage. If it is agreed by *the Project Manager* that this does not materially prevent the issue of an IRN, then the outstanding work is classed as a notified Defect and logged on a list of Defects and made a part of the IRN issue.

The IRN process is given in section 28.6 of this Works Information.

28.5.3 Work Authorisation Document

From the time that an IRN is issued for a Commissioning Lot, all work carried out by the *Contractor* on the Commissioning Lot will be the subject of a Work Authorisation Document (“WAD”), whether it be to complete a test, or to complete, repair, maintain the Commissioning Lot.

Each respective Principal Contractor shall develop and implement the WAD procedure to ensure there is controlled access to areas of live, or potentially live, Equipment and Plant and Materials or systems which are under test or which may be activated from remote locations.

The WAD process is given in section 28.7 of this Works Information.

28.5.4 Access Control

From the time that an IRN is issued for a Commissioning Lot and the WAD system is in place, where the *Contractor* is undertaking works therein the *Contractor* shall implement access control measures with respect to the relevant area affected by the Work Authorisation Document as one means of securing the safety controls required under the WAD system.

28.5.5 Certification of Personnel

A system of records shall be established by the *Contractor* for each member of the Testing and Commissioning personnel that clearly shows the activities for which a particular member is certificated and shall be regularly updated to show any upgrading, additional training courses and the like in order to allow regular audits to ensure compliance.

28.5.6 Communications

The *Contractor* shall provide a communication system to cover his own communication needs and to enable Others to carry out their activities during the testing and commissioning phases.

28.5.7 Construction/Commissioning Railway Rule Book

The *Employer's* Systemwide C610 Systemwide Main Works contractor will establish the CCRRB to govern works management within the railway environs during construction and during the testing and commissioning process up to completion of Phase 4 Dynamic testing. The *Contractor* shall comply with the Construction/Commissioning Railway Rule Book.

28.5.8 Operating Rule Book

Phase 5 Trial Runs will be conducted in accordance with the "Infrastructure Manager's Rulebook" and Safety Management System, or the CCRRB if so notified by the *Project Manager*.

28.6 Installation Release Notice (IRN) Procedure

28.6.1 Purpose

To define the methodology for the issue of an Installation Release Notice (IRN)

28.6.2 Scope

28.6.2.1 Inclusions

This process applies to the Installation and Testing & Commissioning phases of Crossrail's Central Section Works as follows:

- All Systemwide Works,

- Stations: Mechanical and Electrical (M&E) Works only,
- Portals: Mechanical and Electrical (M&E) Works only,
- Intermediate Shafts: Mechanical and Electrical Works only.

28.6.2.2 Exclusions

This procedure does not apply to non-functional Commissioning Lots

28.6.3 Process

28.6.3.1 Installation Release Notice (IRN)

The *Contractor* shall issue the required IRN documentation after the *Contractor* has conducted the necessary technical verification tests under phase 2.1 tests to certify that the Plant and Materials that constitute a Commissioning Lot have been constructed and installed in accordance with the Works Information and that the next sub-phase of testing can commence without damaging any part of the *works*, the work of Others, the assets of the *Employer*, the external railway networks or other external facilities.

The Installation Release Notice is a document formalising the transfer of responsibility of a Commissioning Lot from the Installation to the Testing & Commissioning phase.

One IRN shall be issued by the *Contractor* for every Commissioning Lot. Those shall be defined in accordance with the definition of Commissioning Lots document to be prepared by the *Contractor*.

The IRN also provides documentation for the certification of the *works* to ensure the work is of a condition that allows pre-commissioning Phase 2.2 tests to start. Therefore the change of responsibility is clearly documented and advertised so that all involved personnel will be kept aware of the current safety requirements providing a safe and smooth transition from the installation phase to the commissioning phase.

The *Contractor* shall implement the IRN procedure along with the WAD process and the Construction/Commissioning Railway Rulebook to ensure that there is controlled access to areas with live, or potentially live Plant and Materials under test; or Plant and Materials that may be activated from remote locations such that all personnel are clearly aware of the risks and the controls in place to manage those risks.

For a given Commissioning Lot, the IRN will specify a time when the change of status of the Plant and Materials (from quiescent to energised) may take place. By signing of the IRN the WAD coordinator will accept that it is his duty to inform all relevant personnel of the change of status of the Commissioning Lot.

28.6.3.2 Work Authorisation Document (WAD)

The WAD process is implemented for all work on a Commissioning Lot subsequent to the issue of an IRN.

The Principal Contractor at each site shall be responsible for establishing the WAD process.

28.6.3.3 Preliminary Inspections

Preliminary inspections of the Commissioning Lot have to be carried out by the *Contractor's* construction and the QA teams to ensure the conformance of construction work in accordance with accepted *Contractor's* procedures. The *Contractor* via its QA team shall confirm that the installation certification documentation of the relevant Commissioning Lot has been collated and is available for review prior to the IRN meeting.

The contractor who intends to hand over a Commissioning Lot shall first establish with its Testing and Commissioning lead engineer, the limits and completion status of the Commissioning Lot and whether there are any outstanding work activities.

An IRN cannot be issued until a joint inspection by the respective installation and commissioning teams has taken place, and any outstanding items agreed and documented by way of a defects / snagging works list. The list will state clearly all outstanding items and a time scale for their completion. The defects / snagging list will be attached to the IRN Certificate and shall be made available to the *Project Manager* upon request.

Pre-requisites for the *Contractor* to apply for an IRN.

The following documents are required to support the issue of an IRN and shall be provided by the *Contractor*:

1). Commissioning Lot Asset Sheet:

The Commissioning Lot Asset sheet provides the list of assets to the Commissioning Lot it relates to.

2). Design Certification:

Design Certificates where applicable and where related to the Commissioning Lot shall be transferred to the Testing and Commissioning team.

3). Manufacturing Certification:

Factory Acceptance Tests Certification for all the assets listed on the Commissioning Lot Asset Sheet.

4). Installation Certification:

The Installation Certification documents are the documents that provide evidence that installation was performed in accordance with the certified designed and demonstrate that it is safe to energise the Commissioning Lot.

All the necessary inspections and tests and their frequency, procedures to be applied and any records (including check sheets) required during the installation phases will be detailed in Inspection and Test Plans (ITPs) prepared by the *Contractor*. The ITPs are composed of Installation Record sheets to be used and managed by the Construction Team and gathered by the *Contractor's* Quality Control engineer.

Where relevant, Test Reports will be produced by the *Contractor* that will gather Phase 2.1 Test Data Sheets. Test Reports will be submitted to the *Supervisor* for acceptance to confirm that Phase 2.1 tests have been carried out in a satisfactory manner.

5). As-built marked-up Issued For Construction (IFC) drawings:

The *Contractor* shall prepare the red line drawings where applicable when modifications are implemented during the installation phases on the specified Commissioning Lot.

6). Defects / Snagging List:

A list of outstanding issues related to the Commissioning Lots

Note: The inability to provide all above mentioned documents shall prevent the sign-off of the associated IRN.

28.6.3.4 Completing the IRN Document

Once the above pre-requisites are met, the *Contractor* will manage the completion and administration of the IRN certification. The completion of the IRN should be as follows:

Part 1

IRN certificate reference numbers and descriptions will be prepared prior to the IRN meeting by the *Contractor* in line with an agreed numbering system and the definition of Commissioning Lots.

Relevant personnel as identified in part 1 of the IRN will sign, print and date the certificate.

By signing the IRN the *Contractor's* QA Department certify that the documentation is valid and has been prepared under the agreed quality regime

Part 2

The time and date are to be established so as to give sufficient time for the WAD Coordinator to inform all relevant contractors of the change of status of the Commissioning Lot.

Part 3

To be completed by the WAD Coordinator after receiving acknowledgement from the relevant contractors impacted by the change of status.

28.6.3.5 IRN Distribution

Original of the IRN shall be forwarded to the *Supervisor* for filing.

Five copies of the IRN documents are distributed as follows:

IRN copy 1	to	<i>Contractor's</i> Construction Lead Engineer
IRN copy 2	to	<i>Contractor's</i> T&C Manager
IRN copy 3	to	<i>Contractor's</i> WAD Coordinator
IRN copy 4	to	Contractor(s) QA

IRN copy 5 to Logistics Rail Movement Controller (RMC)

28.7 Work Authorisation Document (WAD) Procedure

28.7.1 Purpose

To set out the process for control and co-ordination of work activities on a Commissioning Lot subsequent to the issue of an Installation Release Notice (IRN).

28.7.2 Scope

28.7.2.1 Inclusions

This instruction applies to following elements of the Central Section of Crossrail's works:

- Systemwide works
- Mechanical and Electrical (M&E) works in Stations
- Mechanical and Electrical (M&E) works in Intermediate Shafts
- Mechanical and Electrical (M&E) works at Portals

This procedure is to be applied by the *Contractor* for its *works* and the works of Others which are undertaken in the areas where the *Contractor* is designated Principal Contractor.

28.7.2.2 Exclusions

This procedure does not apply to non-functional Commissioning Lots such as Civils, Building and Structures elements of the *works*.

This procedure does not allow authorisation to work on any Network-Rail, LUL, DLR or other third party controlled infrastructure.

28.7.3 Work Authorisation Document Process

28.7.3.1 Principles

The Work Authorisation Document (WAD) instruction forms part of the Commissioning Plan to be issued by the *Contractor*. This procedure is to be read in conjunction with the testing and commissioning process and the IRN procedure.

The WAD process is implemented to control and co-ordinate the management of work activities on Commissioning Lots that have been subject to an IRN.

All work activities on Plant and Materials and Equipment within those Commissioning Lots are subject to planning and authorisation by relevant parties.

Each *Contractor* shall appoint a WAD Coordinator who shall manage the WAD applications

28.7.3.2 Installation Release Notice (IRN) The completion of the *Contractor's* installation activities including technical verification under Phase 2.1 testing on a Commissioning Lot shall be formalised by an IRN issued by the *Contractor* as detailed in section 28.6.

The WAD Coordinator for the area where the work is to be carried out acknowledges by signing on the IRN certificate that a Commissioning Lot will undergo a change of state from quiescent to energised by informing the *Project Manager*, all Others and all relevant parties of the change of status of the Commissioning Lot.

The WAD Coordinator keeps an up to date register of all Commissioning Lots that have attained IRN status.

28.7.3.3 Principal Contractor Authorisation

Under the CDM Regulations 2007 each Principal Contractor must take reasonable measures to ensure that no unauthorised person enters the area where the work is to be undertaken. Only personnel, who are explicitly authorised, individually or collectively, by the Principal Contractor, should be allowed access to the work area.

The Principal Contractor manages authorisation of all Others and relevant parties for the work area to be accessed, via a Principal Contractor authorisation.

28.7.3.4 Work Authorisation Document (WAD) Form

All work that is subject to the WAD process requires the authorisation of the Contractor's testing and commissioning lead engineer(s).

For the WAD form refer to the appendix 28C. The WAD should detail:

- Location details
- Work description
- Permits to Work / Safety Rules
- Acceptor
- Commissioning Lot Reference

28.7.3.5 Electrical Safety Rules

For work involving electrical isolations, the relevant *Contractor's* safety rules must be applied e.g. OHLE Safety Rules, M&E Safety Rules and the like.

28.7.3.6 Works Coordination

To manage and coordinate the work, a planning meeting chaired by the WAD Coordinator is to be convened weekly commencing from the first WAD application.

A person wishing to carry out work must arrange, in advance, at the weekly WAD meeting for a worksite to be granted.

During the WAD meetings all planned work requests are described and discussed.

All of the contractors' Installation or Testing and Commissioning responsible nominated persons involved in the proposed work shall attend these meetings.

Other attendees include but are not limited to:

- The WAD Coordinator (Chair)

- The permit office manager
- The power supply manager (where applicable)
- *Supervisor/Project Manager* 's representative

It is the responsibility of the testing and commissioning responsible engineers to co-ordinate their work activities with all Others and interested parties by means of the WAD meetings in conjunction with the WAD Coordinator.

The planning meeting will allow all parties involved to analyse the valid WAD requests sent in due time to the WAD Coordinator prior to the meeting.

Agenda of the meeting:

- Review all WAD requests for proposed works to be undertaken
- Accept or reject requests according to available documentation and compatibility with other work
- Identify the need for Permit to Work(s)

Weekly Request

It is the respective contractors' testing and commissioning nominated engineers' responsibility to send their planned works requests to the relevant WAD Coordinator in advance on a weekly basis prior to the beginning of their works.

The respective contractors shall identify on which Commissioning Lot(s) they intend to work and whether or not they need a WAD by checking on the WAD register if an IRN has been issued for the relevant Commissioning Lots,

The respective contractors shall send to the relevant WAD Coordinator a weekly request listing all work that they intend to perform together with the start date and durations of the work activities. These requests will then be discussed at the WAD meeting of the same week for work proposed for the following week and beyond.

Information to be provided on the weekly request should cover the following as a minimum but not be limited to:

- The nature of the works
- The date(s)/durations
- The team leader
- WAD exempted works.
- Location details
- The Commissioning Lot(s) reference
- Method Statement / Test Procedure

- Permits to Work (if applicable)
- Permit issuer (if applicable)

WAD Distribution

The WAD is published in a daily notice via a WAD form and distributed by the WAD Coordinator to all relevant contractors' Testing and Commissioning lead engineers, construction managers, the railway logistics manager (where applicable) and the *Supervisor / Project Manager*'s representative.

WAD Form (refer to appendix 28C)

The WAD form is compiled and distributed by the WAD Coordinator as part of the weekly and daily notice the week and day before the proposed works are to be performed. Recipients of the weekly / daily notice will include, but not be limited to, all testing and commissioning installation nominated persons, the railway logistics manager (where applicable), the rail movement controller (where applicable) and the *Supervisor / Project Manager*.

The nature of the work contained on the WAD form is anticipated to be as follows:

- Works impacting on IRN locations but not requiring a Permit to Work.
- Works impacting on IRN locations and requiring Permit to Work.
- WAD exempted works.

28.7.3.7 Plant Room Access / Availability

Plant room access is managed and maintained by each Principal Contractor. The Principal Contractor must provide access to all requesters provided that the requestor has the appropriate WAD / daily notice authorisation and the appropriate permits to work where required.

Contractors requiring access to a Plant room should meet the requirements of the relevant Principal Contractor's room access procedure and room availability procedure.

28.8 Appendices

Appendix 28A Installation Release Notice (IRN) Form

Appendix 28B WAD Register

Appendix 28C WAD Form

Part 29 – *Contractor's Design, Assurance, Records and Certification (Systemwide)*

29.1 Design

29.1.1 Introduction

Unless otherwise stated in the Works Information the *Contractor* shall be responsible for the design of all Plant and Materials and Equipment and for the preparation of any shop fabrication, manufacturer's and construction drawings necessary to Provide the Works.

This part of the Works Information applies to all systemwide works and describes the process to be followed in design, assurance, and certification of the *works*.

The *Contractor's* process in its design, assurance and certification shall follow good industry practice for similar works

29.1.2 Employer's Requirements

The *Employer's* requirements comprise:

- Sponsor's Requirements;
- Crossrail Project Functional Requirements (CPFR);
- Crossrail Act 2008;
- Environmental Minimum Requirements (including the Crossrail Undertakings and Assurances Register);
- Crossrail New Works Standards Baseline;
- Design Demarcation Boundaries;
- RAM Requirements; and
- Maintenance Principles.

The *Employer's* specifications and reference design documents included in the Works Information have been prepared in accordance with the *Employer's* requirements and therefore if the *Contractor* proposes alternative design schemes to the *Employer's* specifications and the constraints of the reference design the *Contractor* shall demonstrate that the alternative designs complies with all of the *Employer's* requirements.

29.1.3 Technical Assurance

The *Contractor* shall prepare all design, undertake the *works* and produce documentation to achieve the safety certification and safety verification in accordance with United Kingdom railway regulations including the Railway (Interoperability) Regulations 2011 and the Railways and Other Guided Transport Systems (Safety) Regulations 2006 as applicable to the *works*.

The *Contractor* shall provide to the *Project Manager* all information to assure the *works* to the duty holders (Infrastructure Managers of London Underground, Rail for London and Network Rail) who will operate and maintain the completed railway assets.

The *Contractor's* design records and certification system shall satisfy the ISO9001 requirements for the control of records and shall be established to provide evidence of conformity to requirements and will include:

- the *Contractor's* Design Statements accepted by the *Project Manager*;
- certification of the *Contractor's* design in particular certification that the design complies with the accepted Design Statements and fully integrates with the design of interfacing systems including those to be provided by Others. The template for the Design Certificate is given at Appendix 29B to this Works Information. The certificate and supporting evidence shall be subject for acceptance by the *Project Manager*;
- the *Contractor's* design check certificates and independent design check certificates where required and records of *Project Manager's* acceptance;
- evidence that the design is properly co-ordinated with interfacing works designed by Others;
- evidence to demonstrate that risks are managed to be tolerable and as low as reasonably practicable (ALARP);
- as-built records; and
- safety justifications and other information necessary for the duty holders (Infrastructure Managers) to accept that the *works* are safe to maintain and operate.

29.1.4 Design Management and Process

29.1.4.1 *Contractor's* design duties

In respect of the *Contractor's* designed works, the *Contractor's* duties include:

- ensuring all design staff are suitably qualified and competent;

Page 29.2 of 25 Document uncontrolled once printed. All controlled documents are saved on the CRL Document System

- ensuring the *Contractor's* design complies with the *Employer's* specified requirements given in the Works Information;
- preparing approval applications and obtaining all necessary design approvals;
- produce and maintain a coordinated 3D CAD Object Oriented Model in the ECMS
- demonstrating and providing evidence to assure that the *Contractor's* design meets the requirements set out in the Works Information by undertaking design reviews and Design Gate Reviews;
- preparing design submissions and design certificates;
- reviewing the Works Information prior to commencing the *Contractor's* design to ensure that the requirements are unambiguous and sufficient to allow the *Contractor* to proceed with detail design in full compliance with the requirements;
- preparing and making presentations to explain the *Contractor's* design to the *Project Manager*, the *Employer* and Others; and
- advising the *Project Manager* of any non-compliance of the *Contractor's* design during development of the design.

29.1.4.2 Contractor's Design Team

Design Manager:

The *Contractor* shall appoint an appropriately experienced and competent Design Manager who shall be responsible for the management, coordination, quality control and assurance of the *Contractor's* design. The accepted Design Manager will serve as the primary interface with the *Project Manager* on design matters.

Competency of Design Team:

The *Contractor* shall ensure that only qualified and competent professional designers undertake design work. The *Contractor* shall maintain a design staff competency matrix indicating the roles and responsibilities for development and checking of design output and records of individual's competencies for review by the *Project Manager* upon request.

The *Contractor* shall include in his assessment of the competency of designers the criteria set out in Appendix 4 of "Managing Health and Safety in Construction: Construction (Design and Management) Regulations 2007" the approved code of practice published by the Health and Safety Executive.

Where the *Contractor* subcontracts the design or checking of any part of the *works*, details of the Subcontractor shall be submitted for the *Project Manager's* acceptance in accordance with the *conditions of contract*.

29.1.4.3 Design Management Plan

Within 8 weeks of the *starting date*, the *Contractor* shall submit a Design Management Plan to the *Project Manager* for acceptance. In the case of the first submission of the Design Management Plan the *Project Manager* replies within 4 weeks of the date of submission.

Any further revisions, submissions and responses will be made within the *period for reply*.

The *Contractor's* Design Management Plan shall as a minimum:

- describe how the *Contractor* will produce an integrated, assured, certified design that meets all the requirements of the Works Information,
- describe the engineering and design organisation the *Contractor* plans to put in place to manage and carry out engineering and design activities;
- describe the tools that will be employed to produce the design such as simulation and modelling tools;
- require the establishment of a *Contractor's* Design Statement for each Elementary System of the *works* for which the *Contractor* is responsible to design;
- describe the processes and procedures that are to be implemented in order to deliver a fully compliant design by the dates that are required in the Accepted Programme, including:
 - the *Contractor's* process for planning and control of the design and its development;
 - the *Contractor's* process for systematic review, verification and (as appropriate) validation of design;
 - where appropriate the *Contractor's* process for assessment and mitigation of environmental impacts and incorporation of environmental design requirements;
 - the *Contractor's* design review, verification and validation plans that are appropriate to each design and development stage;
 - design verification reporting;
 - where appropriate, design validation testing plans, testing specifications and reporting;

- co-ordination and integration of the design and management of internal design interfaces (i.e. interfaces within the *works*) and with the systems provided by Others;
- describe the management processes for interfaces with all the different organisations involved in design and development to ensure effective communication and clear assignment of responsibility;
- provide for identification and management of consents and third party approvals required;
- include a process for the confirmation of the category of design check required for each part of the *works*;
- include a process for engineering safety management compliant with Works Information Volume 2B Part 32, Engineering Safety Management of the Works Information; and
- identify the certification and records required to support the progressive assurance of the *works*.

29.1.4.4 Design Statement

Within 12 weeks of the *starting date*, the *Contractor* shall produce a Design Statement for each Elementary System and submit it to the *Project Manager* for acceptance in accordance with the Design Review Process.

Prior to issuing the Design Statement, the *Contractor* shall review the design inputs provided in the Works Information for adequacy and ensure the requirements are complete, unambiguous and not in conflict with each other. The *Contractor* shall notify the *Project Manager* if any requirements are ambiguous and or conflict with each other and propose to the *Project Manager* the necessary resolution to be adopted by the *Contractor* to meet the intended requirements.

The *Contractor's* Design Statement shall address all inputs to the *Contractor's* design and cover as a minimum the following aspects:

- requirements as provided in Works Information, applicable codes and Standards, together with the revisions to be used;
- any derogations or departures required and the category of design check required;
- scope limits covered by the Design Statement;
- general description of the proposals with outline schematics;
- justification for design selection over other possible solutions;
- proposed deliverable list and summary programme for their preparation and submission for review;

- any acceptances required;
- confirmation that the proposals meet relevant Undertakings and Assurances;
- Safety Justification envisaged to be prepared;
- applicable reliability, availability, and maintainability (RAM) criteria;
- environmental design requirements and other mitigation to avoid or reduce environmental impacts;
- consents required to be obtained;
- the interfaces the *Contractor* has identified with Others;
- approvals required from Others (for example Network Rail, London Underground Limited, Rail for London, etc.); and
- any particular constraints.

29.1.4.5 Design and Engineering Deliverables

The *Contractor* shall provide design and engineering deliverables as described in section 29.2.3.

The *Contractor* shall undertake elements of the design in 3D. Such designs (e.g. cable routes, ducts, pipe work, structures and supports, etc.) shall be undertaken using 3D CAD Object Oriented Modelling within the *Employer's* ECMS.

The *Project Manager* will provide the *Contractor* with access to the 3-D CAD models and the associated data used to prepare the *Employer's* civil designs and the *Contractor* shall utilise these models in his design as required.

The *Contractor* shall submit design and engineering deliverables for the review and acceptance of the *Project Manager* in accordance with the accepted Contract Master Deliverable List (CMDL) and with the Accepted Programme.

29.1.4.6 Programme

Within 4 weeks from the *starting date*, the *Contractor* shall submit to the *Project Manager* for acceptance an extract from the Accepted Programme that shows a comprehensive design programme, the applicable design resources and identifying all design activities, deliverables and acceptance activities. The programme is to be baselined to include a comprehensive list of all deliverables. The extract from the Accepted Programme shall identify the *Contractor's* proposed packaging of the design into parts to allow staged release of construction issue drawings to suit the Accepted Programme.

29.1.4.7 Design Coordination

The *Contractor* is responsible for coordination of its design with Others and shall ensure that its design is fully integrated and coordinated with the design of the systems and infrastructure provided by Others or works to be provided by Others

29.1.4.8 Design Progress Meeting and Reporting

The *Contractor* shall:

- arrange fortnightly design progress meetings to be held with the *Project Manager* to status the design progress and any critical issues that need to be resolved; and
- submit the status of the design's progress as part of the *Contractor's* monthly report.

29.1.4.9 Design Reviews and Verification

29.1.4.9.1 Design Reviews

It is the responsibility of the *Contractor* to self-certify the design.

The *Contractor* shall perform systematic reviews of its design in accordance with the *Contractor's* Design Management Plan. The *Contractor* shall invite the *Project Manager* to attend all such design reviews along with other interface parties where necessary. These design reviews shall:

- be undertaken by appropriately qualified competent representatives of the functions concerned with the design and development stage(s) being reviewed;
- evaluate the ability of the design to meet the contract requirements;
- identify any problems and propose necessary actions;
- incorporate interface and integration requirements; and
- record the results of the review and verification activities and document any necessary actions to be taken.

29.1.4.9.2 Design Checks and Independent Design Checks

The *Contractor* shall carry out design checks of its design and depending on the criticality of the design shall arrange for the checks to be undertaken either by competent team members or competent team members which have not been directly involved in the design.

Where Standards or other requirements, such as safety related or critical systems, require an independent design check, the *Contractor* shall employ a competent and independent Subcontractor to undertake the design check.

On completion of any independent design check of the design, the *Contractor* shall issue the completed design check certificate to the *Project Manager*.

29.1.4.9.3 Design Gate Reviews

The Design Gate Reviews process is to be used by the *Contractor* to provide the *Project Manager* and other stakeholders with confidence that the design package will meet its requirements and will be fit for purpose. Specific emphasis shall be given to the proving of integration with other Elementary Systems, including those provided by Others.

The *Contractor* shall issue a report to the *Project Manager* at least 2 weeks prior to the Design Gate Review.

The *Project Manager* shall be invited to all Design Gate Reviews and the *Contractor* shall invite where required the interfacing parties and the *Employer's* infrastructure maintainers and Others when requested by the *Project Manager*. The reviews shall be held in the *Project Manager's* premises unless agreed otherwise.

The *Contractor* is fully responsible for the Design Gate Review, its content, organisation, documentation of the results of the process and close-out.

The *Contractor* shall carry out formal Design Gate Reviews during the development of the design at the stages listed below. The *Contractor*, at all times has the responsibility to achieve design verification.

- Design Gate Review 1 – when design at about 30% complete coinciding with the issue of the Design Statement as shown on the Accepted Programme;
- Design Gate Review 2 at around the 60% completion stage coinciding with issue of drawings for construction; as shown on the Accepted Programme; and
- Design Gate Review 3 - a final review when the design is 90% complete as shown on the Accepted Programme;

Design Gate Review Plan

The purpose of a Design Gate Review Plan is to provide the *Contractor* and the *Project Manager* with a detailed description of how and when Design Gate Reviews are to be performed on design packages.

There is one Design Gate Review Plan per Elementary System.

Within 8 weeks of the Starting Date the *Contractor* shall prepare the Design Gate Review Plan. The plan shall cover:

- the scope of coverage of the plan i.e. description and limits of the elemental system;
- design package breakdown;
- review remit;
- the review assessment criteria and success criteria;
- level of detail and evidence to be provided prior to the review; and
- details of resources, attendees, timing and venue.

Design Gate Review Presentation

The objective of the Design Gate Review presentation is for the *Contractor* to present a convincing argument to the *Project Manager* that the design is at the specified maturity. The presentation shall in particular present material to evidence the following key aspects:

- the design presented conforms to the specified performance criteria and requirements of the Works Information;
- to ensure that a consistent, quality controlled approach is adopted;
- to demonstrate that the design is integrated with other parts of the contract and that they fit within the *Employer's* requirements;
- to confirm the current status of the design check process;
- to identify and obtain from the *Contractor* justification for specific deviations or departures from the Standards and design inputs;
- to ascertain the approval status of design changes;
- to confirm that the *Contractor's* proposed design provides an economic solution;
- to confirm whether any further independent reviews are required;
- to report on the status of document reviews by the *Project Manager*;
- to identify the status of applicable Consents and Acceptances / Approvals required from Others throughout the design and construction process and to confirm that the Consents have been obtained or have been applied for;

- to confirm compliance with Crossrail New Works Standards Baseline and any additional standards applicable at interfaces;
- to identify safety hazards, their control, and the degree of residual risk to be managed;
- to identify all tests or demonstrations that are required for validation of the *works*;
- any other relevant information and data such as:
 - progress on interface development and design;
 - drawing and document status; and
 - areas of concern/difficulty (risk) to the design.

Design Gate Review Report and Close Out

The *Contractor* shall produce a Design Gate Review Report in a format to be agreed with the *Project Manager*. The Design Gate Review Report is to be issued by the *Contractor* 5 working days following the Design Gate Review for acceptance by the *Project Manager*.

If the Design Gate Review is successful, the *Project Manager* will sign a Design Gate Review release with or without conditions. If the Design Gate Review is rejected a rework programme shall be submitted to the *Project Manager* for his acceptance within 5 working days of the Design Gate review rejection..

29.1.4.10 Acceptance of Design

The *Project Manager* will accept *Contractor's* design through reviews of the design deliverables.

The *Contractor* shall submit the deliverables to the *Project Manager* for review and acceptance in accordance with the CMDL and in accordance with the Accepted Programme.

Unless agreed otherwise by the *Project Manager*, the *Contractor* shall allow 3 weeks for the *Project Manager's* review and acceptance of the *Contractor's* design submissions.

Reviews by the *Project Manager* shall result in one of the following review codes being given:

1. Accepted. Work May Proceed.
2. Not Accepted. Revise and resubmit. Work may proceed subject to incorporation of changes indicated.
3. Not accepted. Revise and resubmit. Work may not proceed.
4. Received for information only. Receipt is confirmed.

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29.1.5 Systems Engineering

29.1.5.1 Integration

The *Contractor* is responsible for producing an integrated system that meets the requirements of the Works Information.

The *Contractor* shall describe its processes for integration in the Design Management Plan.

The *Contractor* shall integrate its *works* with the works of Others as necessary to deliver the requirements of the Works Information.

The *Contractor* shall notify the *Project Manager* of any gaps or overlaps between the *works* and the works of Others as soon as they are identified.

Integration Manager:

The *Contractor* shall appoint an appropriately experienced and competent Integration Manager reporting to the *Contractor's* Design Manager who shall provide a point of contact to the *Project Manager*, *Employer*, and Others for integration activities such as:

- Configuration control of interfaces and demarcations,
- Control of design change regarding operations / requirements / specifications
- Resolution of integration conflicts
- Integration testing with Others
- Arrangements for handover packaging
- Interfaces with Others

The Integration Manager shall be co-located with the *Project Manager's* team. The Integration Manager will attend as the *Contractor's* representative the *Employer's* integration forums on a monthly basis.

29.1.5.2 Management of Interfaces

The *Contractor* shall prepare a fully coordinated and integrated design for the *works*. Within this activity the *Contractor* shall identify and manage all interfaces with, and design inputs and outputs from Others and all interfacing organisations.

The *Contractor* shall notify the *Project Manager* of the failure of any interfacing party to cooperate or any other cause of delay to the development of an interface as soon as it occurs.

The *Contractor* shall:

- identify where its design interfaces with the works of Others,
- identify the requirements of each identified interface in conjunction with Others, and
- provide suitable designs for the interfaces within its detailed design.

The *Contractor* shall manage its design of interfaces through:

- liaising and coordinating, including technical interface meetings, with Others undertaking interfacing design. The *Project Manager* shall be given the opportunity to attend all such meetings. The purpose of the interface meetings is to resolve in a proactive and collaborative manner incomplete, ambiguous or conflicting design input requirements, and raise interface actions to track their closure,
- participation in the design reviews of Others as required,
- the reviewing of design documents produced by Others as required;
- the production and maintenance of Interface Specifications documentation where the *Contractor* is designated as the “owner” of the interface in the interface matrices contained in Works Information Volume 2A,
- the review and acceptance of Interface Specifications documents produced by Others.

Interface Requirements Specifications:

The Interface Requirements Specification (IRS) represents the definitive reference for the characteristics of the interface including:

- boundary,
- functional,
- performance,
- design input, and
- design constraint requirements.

The IRS or IRSs shall be created by the *Contractor* where it is the designated owner as specified on the Interface Matrices given in Works Information Volume 2A.

The parties to which the IRS relates shall confirm acceptance to the IRS in a formal manner through joint sign off.

The IRS shall be simple and concise, clearly explaining the interface being documented. It must be aligned with, and make reference to, the design produced by the *Contractor* and Others that are involved with the interfacing design. The IRS must clearly stipulate the interface design responsibilities and demarcation for the *Contractor* and the Others. The level of detail in the IRS must reflect the complexity of the interface.

Detailed Interface Requirements:

Detailed Interface Requirements (DIRs) documents are reserved for the more complex functional interfaces which require more significant integration of design between the *Contractor* and Others.

The DIR shall be created by the *Contractor* where it is the designated owner as specified on the Interface Matrices given in Works Information Part 2A.

The parties to which the DIR relates shall confirm acceptance to the DIR in a formal manner through sign joint off.

The DIR shall clearly describe each interface and aspects such as:

- requirements and constraints;
- data flows;
- cross-boundary functions;
- protocols and sequencing;
- degraded modes of operations; and
- testing and commissioning requirements

Interface Actions:

The *Contractor* shall develop and agree interfaces with Others. The *Contractor* shall lead in the resolution of such queries and actions in a proactive manner and is fully responsible for the resolution of each issue.

Where such interface queries or disagreements between the *Contractor* and the Others cannot be clarified immediately and require further action, the *Contractor* shall raise an action and capture it within the *Contractor's* interface action tracker.

The *Contractor* shall keep up to date its interface action tracker and shall include the action description, who raised the action and who is responsible for closure, target date for closure, and current status.

The *Contractor's* tracker can be a dedicated interface action tracker, or may be included in another of the *Contractor's* action trackers. The tracker must clearly identify/tag the action as an interface action. The tracker shall be made available to the *Project Manager* on a regular basis and upon request.

29.1.5.3 Human Factors

Within 8 weeks of the starting date the *Contractor* shall submit a Human Factors Engineering Plan to the *Project Manager* for acceptance either as a part of the Design Management Plan or as a separate document in the case of the first submission the *Project Manager* replies within 4 weeks of the date of submission.

The Human Factors Engineering Plan shall describe the human factors activities to be undertaken to support the design and delivery of the *works* and shall contain the following information:

- a description of the human factors activities necessary in respect of each Elementary System . The description shall cover all user interfaces that are within the scope of the *Contractor's* design;
- a description of the human factors deliverables and their timing with respect to the *Contractor's* Design Gate Reviews (NB human factors deliverables shall be listed in the CMDL);
- a description of how the human factors activities are integrated into the *Contractor's* design process;
- a listing of the railway, national and international human factors and ergonomics standards which will be applied; the listing shall include the relevant standards within the Crossrail New Works Standards Baseline as applicable to the *works* and as mandated in the specifications given in Works Information;
- details of how human factors requirements will be generated, documented and incorporated in the *Contractor's* design;
- proposals for involving Others (who may be end users) in the various stages of the design and delivery including testing and commissioning; and
- details of how the *Contractor's* design will be assured with respect to compliance with the applied human factors standards; including details of any proposed simulations or mock-ups.

The *Project Manager* shall arrange the involvement of the appropriate end-users to participate in the *Contractor's* human factors activities as described in the *Contractor's* accepted Human Factors Engineering Plan.

29.1.6 RAM (Reliability, Availability and Maintainability)

The *Contractor* shall undertake RAM design activities in compliance with the Works Information Volume 2B – Part 30 RAM and any specific RAM targets specified in Works Information Volume 2C.

29.1.7 EMC (Electromagnetic Compatibility)

The *Contractor* shall undertake EMC design activities in compliance with the Works Information Volume 2B – Part 31 EMC and any specific EMC requirements specified in Works Information Volume 2C.

29.1.8 Not Used

29.1.9 Standards

29.1.9.1 Crossrail New Works Standards Baseline

The *Contractor* shall comply with the Crossrail New Works Standards Baseline as applicable to the *works* and as mandated in Works Information Volume 2C.

Where the *Contractor* seeks a departure from the Crossrail New Works Standards, a concession request shall be submitted to the *Project Manager* in a format and following a process for consultation and review which has been accepted in advance by the *Project Manager*.

The *Contractor* shall not assume that a concession will be granted by Others (e.g. standard owners).

Requests for departures from any Standards must be submitted to the *Project Manager* at least 2 months prior to the 60% Design Gate Review. The request must contain the following as a minimum:

- Standard from which departure is required and owner;
- Details of clauses from which departure is required;
- Justification for departure;
- Proposed alternative arrangements;
- Risk assessment demonstrating that the alternative arrangements will control risks to ALARP.

29.1.9.2 CAD Data

The CAD Data shall be produced in accordance with the *Employer's* CAD Standard doc No: CR-STD-005 given in the Crossrail New Works Standards Baseline.

29.1.10 Engineering Safety Management

The *Contractor* shall implement an engineering safety management system consistent with Works Information Volume 2B, Part 32 - Engineering Safety Management in order to assure the safety of the *Contractor's* systems within the scope of the Works Information.



29.1.11 Value Engineering

The *Contractor* shall include in its Design Management Plan a process for the identification and development of value engineering opportunities in the design.

Throughout the preparation of the design, the *Contractor* shall advise the *Project Manager* of any identified value engineering opportunities.

29.1.12 Not Used

29.1.13 Constructability

The *Contractor* shall carry out constructability reviews and provide reports and location specific Construction Works Plans which demonstrate the actual constructability of its designs.

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29.2 Assurance, Records and Certification

29.2.1 General

This section sets out the obligations of the *Contractor* with regards to:

- the provision of progressive assurance of the *Contractor's* design and the *works*;
- the provision and maintenance of records to be generated during installation and testing phases of the *works*;
- the requirements for the retention of records by the *Contractor* and the submission of key records to the *Project Manager* prior to Completion and
- The certification of parts of the *works* at key stages of the contract.

For the purposes of this section records means all drawings, CAD Data, specifications, calculations, software, schedules, reports, consents, approvals, permits, licences, authorisations and the like that evidence the progress and compliance of the *works* through to Completion and the correction of Defects notified as outstanding at Completion or notified thereafter up until the *defects date*.

These records include documents submitted during the course of the *works* to verify compliance with the requirements specified in the Works Information including but not limited to the parts listed in the table given in Appendix 29D to this Works Information.

Records shall be sufficiently detailed to provide assurance of compliance with the Works Information and provide support to the *Contractor's* self certification process. All records shall be signed off by a competent person from within the *Contractor's* organisation.

The *Contractor* shall issue any revised records and additional records required at the *defects date* following completion of any outstanding work and correction of any Defects.

29.2.2 Assurance to be Provided

The *Contractor* shall provide progressive assurance that the *works* comply with the requirements set out in the Works Information. The *Contractor's* progressive assurance will also be used by the *Project Manager* and *Employer* to demonstrate that the legal commitments and obligations placed by Sponsors Requirements and under the Crossrail Act 2008, have been discharged.

Progressive assurance means that there will be continual confirmation of compliance by the generation of contemporaneous records.

Within 6 weeks of the *starting date*, the *Contractor* shall develop an Assurance Plan and submit it to the *Project Manager* for acceptance. In the case of the first

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submission of the Assurance Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*.

The Assurance Plan shall describe the means by which the *Contractor* will provide progressive assurance on this contract. The *Contractor* shall also provide final assurance by means of certification of compliance with the requirements of the contract. Assurance shall also be provided as described in section 29.2.9 "Certification to be Provided".

The table attached in Appendix 29D indicates (for information only) the parts of the Works Information for which the *Contractor* will be required to provide assurance evidence.

29.2.3 Deliverables and Records

29.2.3.1 Deliverables

Within 4 weeks of the *starting date*, the *Contractor* shall produce a Contract Master Deliverables List (CMDL) relevant to the scope of work to be provided utilising the template in Appendix 29C and submit it to the *Project Manager* for acceptance. In the case of the first submission of the CMDL the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*. The *Contractor* shall review and submit the CMDL periodically as agreed with the *Project Manager* with final acceptance of the CMDL being granted on Completion or as necessary, on or around the *defects date*.

The CMDL shall:

- include a programme for the production and submission of deliverables;
- identify those deliverables which require approval from Others (for example NR, LUL, DLR, ORR and LFEPA) such that sufficient time is allowed to avoid approvals delaying or disrupting the *works*;
- any other applicable deliverables required by Volume 2B documents;
- any additional deliverables identified by the *Contractor*.

The *Contractor* shall submit to the *Project Manager* one hard copy of the deliverable records and one copy in electronic format compatible with the software requirements detailed in Works Information. Where a deliverable contained in the CMDL is also an item that is managed via the ECMS then the *Contractor* provides all associated CAD Data as a part of the deliverable in accordance with the ECMS workflow. In addition the *Contractor* shall retain the hard copy of the submitted deliverable, with signed *Project Manager's* acceptance record until Completion of the whole of the *works*.

Where the *Contractor* submits records for onward transmittal to Others, such records shall be in one hard copy and one copy in electronic format.

29.2.4 Contractor Records

Contractor Records are records that the *Contractor* shall maintain and retain at a location to be accepted by the *Project Manager*. Any *Contractor* record/archiving procedure shall clearly indicate responsibilities for records retention and include details of the location and back up arrangements.

29.2.5 Access, Submission and Retention

Access to all records retained by the *Contractor* is to be provided to the *Employer*, the *Project Manager* and Others authorised by the *Project Manager*. The *Project Manager* and / or the *Employer* shall be allowed to copy records as necessary.

Each record detailed for retention by the *Contractor* is to be in the form of both etched CD and hard copy with due attention being paid to Clause 4.2.4 of ISO 9001:2008 with regards to legibility, identity, "retrievability" and protection. Superseded documents are considered to be records.

29.2.6 Submission of Deliverable and Assurance Records

The *Project Manager* shall provide to the *Contractor* standard forms for the *Contractor* to generate certain quality records. These standard forms are compatible with the *Employer's* EDMS but do not affect the need for the *Contractor* to provide information and documents specified in the contract.

The *Employer* shall provide the *Contractor* access to the EDMS for loading and managing documents and to record certain contract deliverables. The *Contractor* shall be responsible for the management, operation, training of personnel and for all data input into the system.

Records shall be collated, packaged, indexed and submitted by the *Contractor* in a phased manner for each Sub-system, Elementary System, activity or section in accordance with the Works Information.

29.2.7 Project Technical Request Database

The *Employer* shall provide access for the *Contractor* to the Project Technical Request database, a web based software package for the purposes of managing Requests for Information, Field Change Documents and Non Conformance Reports.

29.2.8 As Built and Operational Records

29.2.8.1 General

The *Contractor* shall keep a full set of the latest issued for construction (IFC) construction drawings, associated data and specifications on the Site marked up (Red Lined) for changes and notes and other information to accurately record all changes during construction, including any *Project Manager's* instructions and technical queries, Requests For Information, Field Change Documents, Non-Conformance Reports and any other relevant data.

Changes from the Works Information design to as-built position when identified by any of the above communications, or for any other reason, shall be fully dimensioned and clearly marked on the drawing. Any changes from the design to the as-built condition which is recorded on documents other than drawings e.g. standards, shall be referenced on the Revision X (Red-Line) with a note to the associated instruction, request for information, field change document or other relevant data. These shall reference the communications noted on the drawing. Revision clouds shall be used to aid the identification of any changes. Such drawings shall be issued at Revision X (Red-Line)

The *Contractor* is required to generate contract specific document numbers for all revision X (red line) drawings within the ECMS for each individual drawing using the approved taxonomy. The *Contractor* is also required to issue the revision X (red line as Scanned PDF or electronically DGN) by uploading each individual drawing onto the ECMS, together with the *Employer's* standard Register and Issue Record (RIR) on a formal transmittal to the *Project Manager*

29.2.8.2 Operational Records

The *Contractor* shall submit a list of those records considered necessary for operational and maintenance purposes to the *Project Manager* for acceptance.

The *Contractor* shall create the Revision X (Red-Line) drawings, as outlined above and shall forward the Revision X (Red-Line) drawings to the *Project Manager* four weeks prior to completion of any part of the *works*.

When the *Project Manager* accepts that Revision X (Red-Line) drawings reflect the as-built condition, by notification, the *Contractor* shall electronically re-draft at Revision Z to reflect the As-Built (operational) condition in the ECMS. All references on the Revision X (Red-Line) drawings to changes, such as technical queries, Requests For Information, Field Change Documents, Non-Conformance Reports, standards or other relevant data, shall be incorporated into the Revision Z, such that the references are removed.

29.2.8.3 Drawings and records not required to be "As-Built"

Drawings and records in the following categories are not required to be "As-Built" except where a permanent element of the *works* is also shown on the same drawings, in which case the permanent element of the *works* element only is required to be "As-Built"

- temporary works drawings, except where the temporary works are required for interim maintenance, operational or safety purposes.
- Systemwide stageworks drawings leading up to the final arrangement.
- construction access drawings except where such access is also access to a permanent element of the *works*.

- site clearance and demolition, except where a structure is partially demolished, or there is a requirement to inform a follow on contractor or party of specific risks not removed by demolition or site clearance.

29.2.9 Certification to be Provided

The *Contractor* shall certify that its design, fabrication, installation and testing complies with the contract. The *Contractor* shall issue all certificates to the Project Manager for review and acceptance in accordance with the CMDL and the Accepted Programme.

The diagram given in Appendix 29F - Certification of Systemwide Works, depicts the overall Systemwide Certification requirements and process. The *Contractor's* certification is to be provided in accordance with the principles given in this appendix and Works information Volume 2B, Part 28 - Testing and Commissioning Process and this part of the Works Information. In particular the *Contractor* shall provide the following:

1. Manufacturing Certification:

Factory Acceptance Test records shall be produced per equipment, sub-system and/or system in accordance with Works Information Volume 2B, Part 28 – Testing & Commissioning Process.

2. Design Certification:

The following certificates shall be produced:

- Design Certificates per Elementary System to certify compliance with the Design Statement.
- Design Gate Review acceptance at 30%, 60% and 90% design stages; and
- Design Check and Independent Design Check Certificates where required.

3. Installation Certification

The *Contractor's* installation is to be certified to comply with the *Contractor's* design and the relevant installation quality procedures and standards in accordance with the IRN (Installation Release Notice) process contained in Works Information Volume 2B, Part 28 – Testing & Commissioning Process. The following certificates shall be produced:

- Installation Release Notice for each sub-system of a commissioning lot defined by the *Contractor*.

4. Testing and Commissioning Certificate:

Testing and commissioning certification shall be undertaken in accordance with the requirements of Works Information Volume 2B, Part 28 - Testing and commissioning Process.

The diagram below depicts the certificates that shall be provided at the various stages of the testing and commissioning activity.

Each certificate shall be accompanied with a supporting record package listing as given in Appendix 29H. The package listing is a live document and shall be updated for a given Elementary System at each stage of the testing certification process.

29.2.10 Asset Management & Traceability

The *Employer* will develop and manage asset information provision processes which should provide assurance that asset information is of suitable quality and to minimise the overall cost of asset information provision to both the *Contractor* and the *Employer*. These processes may be refined over the life of the contract to improve the effectiveness of asset information provision.

The *Contractor* shall be responsible for the provision of asset labels; the *Contractor* shall complete and submit to the *Project Manager* the Asset Data Collection forms in a timely manner thus allowing the *Employer* to issue the required asset label information.

The *Employer* shall operate managed processes to ensure consistent asset information is provided for each contract. In order to ensure consistent approaches to asset hierarchies and asset classification, the development and population of the asset hierarchies shall be undertaken by the *Employer*. Classification of assets will be based upon the Uniclass Standard and shall be undertaken by the *Employer*.

Contractors shall be issued by the *Employer* with Asset Data Collection Forms relevant to their contract with the required attributes specified. *Contractors* shall populate the Asset Information Provision with all requested details and within the timescales specified in the information request.

The *Employer* will provide suitable briefing and training sessions to *Contractors* to ensure that they are aware of their responsibilities within the overall process.

An example data collection form is included in Appendix 13L.

All asset data shall conform to the *Employer's* standards as specified in the Standards Baseline and the *Employer's* Asset Information Management Plan – CRL1-XRL-O8-XTC-CR001-00007.

At an appropriate time the *Contractor* shall be provided with extracts of the *Employer's* Asset Information Management System (AIMS) database by the *Project Manager* containing planned assets to be constructed/ modified/ demolished/preserved/ interfaced by the *Contractor* as detailed in the Asset Information Management Plan CRL1-XRL-O8-XTC-CR001-00007. These extracts will contain assets adjacent to the Site which the *Contractor* may need to be aware of.

Throughout the contract, the *Contractor* shall be responsible for the safe storage and management of the extracts of the *Employer's* Asset Information Management System (AIMS) supplied to them. They shall maintain suitable controls to prevent the loss, deletion, corruption or degradation of the Asset Register consistent with current industry good practice.

The *Contractor* shall populate the extracts of the *Employer's* Asset Information Management System (AIMS) to support future operational, maintenance and asset management activities. The Asset Information Management System (AIMS) extracts shall be updated to contain the complete asset listing covering the contracted works.

AIMS shall enable storage and access of the following information to *Employer's* standards:

- Asset identification
- Asset location
- Asset classification to the classification standards of the relevant infrastructure manager
- Asset status
- Asset criticality
- Asset attributes specific to the relevant class of asset
- The capability to store identifiers to allow linkage to other information systems

AIMS extracts shall be populated by the *Contractor* with all specified data updates to comply with *Employer* requirements and shall be fully populated no later than four weeks after the relevant asset has been installed/ set to work. The *Contractor* shall maintain at all times traceability of all assets and line wide replaceable units, including failure during testing and commissioning and product swap-out.

All assets, down to the line replaceable unit, shall have a unique identification number that is capable of being used to consistently identify the asset electronically and manually. Unique identification shall be compliant with the *Employer's* Asset Identification Standard (CRL1-XRL-O6-STD-CR001-00031).

All assets installed or supplied by the *Contractor* shall have a durable label or name plate appropriate to the environment either securely fixed to the asset, or securely fixed adjacent to the asset. These labels shall be compliant with the *Employer's* Asset Identification Standard (CRL1-XRL-O6-STD-CR001-00031).

The *Contractor* shall be accountable for the management, storage and population of the Asset Register data and shall attend, and contribute to *Employer* data governance meetings when required.

If changes are required to the *Employer's* standard reference data, then the *Contractor* shall notify the *Project Manager*.

The *Contractor* shall ensure that all data population and updates are consistent with the *Employer's* quality requirements. This shall include ensuring that the accuracy, validity, precision, completeness and timeliness of asset information comply with the *Employer's* standards – listed as:

- Asset Identification Standard CRL1-XRL-O6-STD-CR001-00031
- Asset Information Management Plan CRL1-XRL-O8-XTC-CR001-00007.

The *Contractor* shall instigate suitable checks and audits of data quality to demonstrate that *Employer's* standards are being complied with and shall demonstrate the effectiveness and outputs of these processes to the *Project Manager*, when requested.

Requirements for the coding and numbering of *Employer* assets shall be compliant with the *Employer's* Asset Identification Standard (CRL1-XRL-O6-STD-CR001-00031).

The *Contractor* shall nominate a relevant senior employee as Data Owner who shall be accountable for the management, storage and population of the Asset Register data. The Data Owner shall attend, and contribute to *Employer* data governance meetings when required.

29.2.11 Software Development

The requirements for software development to be applied by the *Contractor* in supplying software based systems shall comply with EN50128, EN 50126 and EN50129 unless agreed otherwise with the *Project Manager*.

29.3 Appendices

Appendix 29A	<i>Not Used</i>
Appendix 29B	Design Certificate Template
Appendix 29C	Contractor – Contract Master Deliverables List Template
Appendix 29D	Parts of the Works Information requiring Assurance Evidence
Appendix 29E	Inspection Request Form
Appendix 29F	Certification of Systemwide works
Appendix 29G	Asset Data Collection Form
Appendix 29H	Record Package Listing

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Part 30 – Reliability, Availability and Maintenance (RAM)

30.1 General Principles

The *works* are to be designed to meet high performance criteria. To this end Reliability, Availability, Maintainability (RAM) requirements have been set by the *Employer* for the Elementary Systems and some of their Elements.

The *Contractor* shall demonstrate to the *Project Manager* that the *works* meet the specified RAM requirements by providing the various RAM assessments, reports and records listed in section 30.2.

The *Contractor* shall follow the approach of British and European standard BS EN 50126:1999 “Railway applications - The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)” and provide the *Project Manager* with the RAM activities plans listed in section 30.2.

Overall achievement of the RAM requirements is dependent on the performance of the interfaces between the *works* and the *Employer's* other contracts. *Contractor's* interface management with others shall include RAM performance at interfacing points.

The *Contractor* shall inform the *Project Manager* of any changes in the *Contractor's* design that may affect the RAM aspect of the *works*.

Progress on RAM shall be included in the periodic report to be submitted to the *Project Manager* and shall include information on studies in progress or completed during the period, concerns, and suggested solutions.

While evaluating alternative designs not only RAM performance will be considered but also overall life cycle cost (LCC).

30.2 RAM Assurance

30.2.1 RAM data

RAM data to be used by the *Contractor* in RAM assessments are, by order of precedence:

- field data from statistically significant populations of existing assets already in operation in environments similar to Crossrail
- RAM-testing data
- data from technical specifications or requirements applicable to components or results from RAM calculations or simulations
- data from generic RAM databases

In all cases, the sources of the data shall be stated in order to produce and maintain an audit trail.

As design progresses RAM data that are used in the analyses shall progressively include data for Sub-systems/LRUs from chosen manufacturers.

These historical data shall be assessed for their suitability in each proposed application and their collection shall comply with following principles:

- organisation of field data collection from manufacturers shall be presented;
- existing users, type of products in operation and their population shall be listed;
- for newly developed items results from RAM calculations, testing or simulations can be used;
- a comparison between already operated assets and assets supplied throughout the contract shall be produced regarding differences in environment, design, manufacturing or installation and consequent variations in RAM characteristics shall be assessed.

30.2.2 Common Cause Failures

The *Contractor* shall ascertain the resilience of designed systems to identified Common Cause Failures and incorporate solutions to reduce their criticality in their design (e.g. routes diversity, Plant diversity etc).

30.2.3 Software and firmware

In the event that the *works* include the provision of software by the *Contractor* then the following requirements shall apply:

- The *Contractor* shall analyse the resilience of service-critical Sub-systems to systematic failures of software and firmware-based elements;
- The preliminary RAM specification, to be provided by the *Contractor*, shall include specific software requirements for service-critical elements;
- The *Contractor* shall provide evidence of development processes they use to minimise systematic errors of developed and adapted software modules;
- The final RAM assessments reports shall include extrapolated reliability of the critical software-based elements and state how it combines with hardware quantifiable RAM characteristics to achieve the system's RAM requirements;
- Methods and tools to be used, such as software complexity metrics, testing coverage ratios or failure density measures, shall be set out in the RAM Management Plan and RAM Demonstration Plan for the corresponding design and testing phases;
- Progress on software faults finding shall be included in the contractual periodic report and a target indicator for software acceptable quality shall be agreed with the *Project Manager* prior to each main testing and commissioning stage.

30.2.4 RAM process

Figure 1 below shows overall RAM engineering process for the *works*, related deliverables and the relation between RAM activities and other processes. The *Contractor* shall base its RAM programme on this model.

All RAM assessments and specifications created by the *Contractor* shall clearly state the system's configuration upon which they are based.

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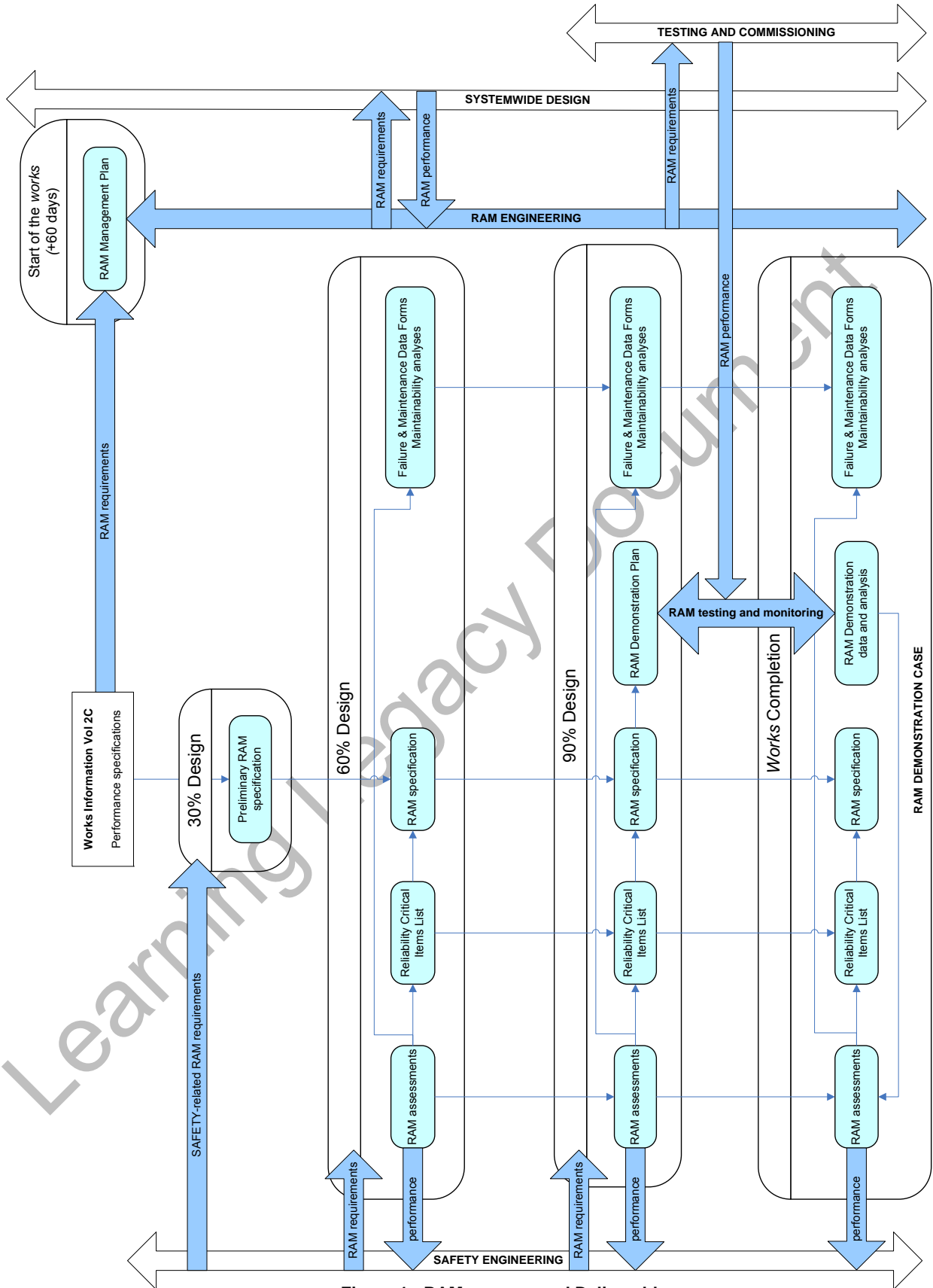


Figure 1 : RAM process and Deliverables

30.2.5 RAM Management Plan

The *Contractor* shall produce a RAM Management Plan and submit it to the *Project Manager* for acceptance within 60 days of the *starting date*.

In the case of the first submission of the RAM Management Plan the *Project Manager* will reply within 4 weeks of the date of submission.

Any further revisions, submissions and responses shall be made within the *period for reply*.

The RAM Management Plan shall detail how the *Contractor* complies with BS EN 50126 and identify the process for demonstrating that the RAM requirements are met.

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

- Organisation of RAM team, including the position within the *Contractor's* organisation for the *works*;
- Management of RAM-related interfaces with Others;
- Identified RAM requirements (including interfaces);
- Planned RAM assessments to demonstrate that the system RAM requirements are met by the *Contractor's* design;
- RAM methods to be used;
- Management of subcontractors' RAM requirements;
- Verification and validation of assessments, including data;
- Validation of RAM requirements during manufacture, installation, commissioning and maintenance;
- Record keeping of RAM assessments;
- List of deliverables, including interim items listed within this document;
- High level schedule for deliverables.

The *Contractor* shall review and update the RAM Management Plan as necessary as the *works* progress to ensure it reflects the current status of the *works*. The revised plan shall be submitted to the *Project Manager* for acceptance.

30.2.6 RAM Assessments

The *Contractor* shall provide RAM assessments to demonstrate that its design will meet or exceed the RAM targets and other RAM requirements allocated to designed Elements at the following three stages:

- 60% Design Gate Review
- 90% Design Gate Review
- Completion

Targets for Low Voltage power (LV) Sub-systems supplied by the *Contractor* or by other contracts are provided in Table 2 LV Sub-Systems RAM Targets.

More stringent targets or additional requirements can be set by the *Contractor* for LV supplies. Any change shall be agreed with Others who provide equipment that the *works* interface with. The *Contractor* shall confirm the agreement with the *Project Manager*.

Actual achievement of RAM targets at all interface points (LV supplies and others) shall be verified by the *Contractor*.

Availability of resources (human and technical e.g. spares, maintenance tools) shall be considered in Operational Availability assessments.

The following RAM assessment reports shall be provided to the *Project Manager* as work progresses:

- FMECA, using typical worksheet format (Table 3) and based on Failure Frequency Scale (Table 4), Operational Severity (Table 5) and Criticality Matrix (Table 6) defined by the *Employer*.
- Data listing (data, source, assumptions) including but not limited to failure rates or MTBF, probability to fail per cycle or on demand, MTTR and MART repair times, preventive maintenance frequencies and downtimes, testing frequency for dormant failures, resources and spares.
- RAM analysis report, incorporating the previously provided FMECA and data listing, a brief system description and a functional block-diagram, all assumptions made for the assessment, RAM results and details of the methodology used

These reports are to be submitted to the *Project Manager* for acceptance according to schedule provided in RAM Management Plan.

30.2.7 Reliability Critical Items list

The *Contractor* shall prepare a Reliability Critical Items list (RCI list) of Plant and LRUs classified by effect on unavailability of the designed Elementary Systems and their Sub-systems.

The main criteria for inclusion of an item in RCI list shall be clearly stated.

The RCI list is to be submitted to the *Project Manager* for acceptance prior to 60% Design Review Stage and updated prior to 90% Design Review stage.

30.2.8 RAM Specification

The *Contractor* shall produce a RAM specification which sets out the RAM requirements for Elements needed to achieve the Elementary Systems' targets and Elements' targets and minimise the life cycle cost.

Prior to Completion the *Contractor* shall demonstrate that the *works* achieve the RAM Specification.

The RAM specification shall not be limited to Availability targets. Intrinsic RAM characteristics such as MTBF and MART shall be allocated to individual Elements where they are required to achieve higher level RAM performance. Table 1 below provides guidance for such specification.

All reliability critical items shall be allocated RAM targets for the criteria which have justified their inclusion in the RCI List.

The RAM specification is to be submitted to the *Project Manager* for acceptance prior to the 30% Design Gate Review (Preliminary RAM specification) and updated prior to the 60% and 90% Design Gate Reviews.

Specified characteristic	Item
<p>Reliability :</p> <ul style="list-style-type: none"> - MTBSAF or Probability to fail per cycle/on-demand - Cumulative failure rates of components 	<p>Elementary System Sub-systems Plant LRU</p>
<p>Maintainability :</p> <ul style="list-style-type: none"> - MART of components - Weighted average of MARTs - Maximum Restore Time 	
<p>Maintainability :</p> <ul style="list-style-type: none"> - Qualitative & technical requirements to reduce IDT and IRT. - MTTR for service affecting failures 	
<p>Availability :</p> <ul style="list-style-type: none"> - Operational Availability - Inherent Availability - Intrinsic Availability 	<p>Elementary System Sub-systems Plant</p>
<p>Other RAM acceptance criteria Any suitable criterion to be checked against for assets acceptance (in relation with RCI list)</p>	<p>Where required</p>
<p>Software/Firmware : SIL or Quality/Reliability requirement</p>	<p>Where required</p>
<p>Operational and Maintenance Requirements Mitigation of failures' criticality by other means than intrinsic RAM characteristics</p>	<p>Where required in FMECA</p>

Table 1 : Guidance for RAM specification.

30.2.9 RAM Demonstration Plan

The *Contractor* shall provide a RAM Demonstration Plan and submit it to the *Project Manager* for acceptance 4 weeks before the 90% Design Gate Review. In the case of the first submission of the RAM Demonstration Plan the *Project Manager* will reply within 4 weeks of the date of submission. Any further revisions, submissions and responses shall be made within the *period for reply*.

The RAM Demonstration Plan shall describe the various tests and analyses needed to provide suitable demonstration of the compliance of installed assets with RAM specifications, it shall include:

- Organisation, responsibility and key personnel involved in RAM demonstration;
- A programme summarising the key RAM demonstration activities, checkpoints and delivery of supporting documentation up to Completion;
- A description of integration and system testing activities on test sites and on the *Employer's* premises in relation with RAM demonstration;
- Requirements for lower-level RAM testing of LRUs, Plant, Sub-systems such as newly developed or bespoke designed items;
- A description of the DRACAS and the procedures for collection, analysis, correction, and documentation of failures.

DRACAS shall be used to ensure all incidents are accurately and consistently categorized as to cause, significance, frequency and chargeability. The DRACAS shall log data on integrated tests and trials, failures, performance and maintenance from the start of testing up to Completion, to provide evidence of reliability growth necessary to support RAM evidence at Completion.

DRACAS shall also be used to initiate any changes to the assets that are required during testing and commissioning phases.

The *Contractor's* DRACAS shall be capable of interfacing with the *Employer's* (Infrastructure Manager's) own DRACAS. Interfaces and data formats shall be requested from the *Project Manager* 3 months before planned start of the testing and commissioning phase for the *works*.

30.2.10 RAM Demonstration Case

4 weeks before the 60% Design Gate Review, the *Contractor* shall provide, for the acceptance of the *Project Manager*.

- Failure Data Forms, see Appendix 30A
These forms will provide a brief summary identifying potential failures for the Plant, Sub-Systems and Elementary Systems and identify if these failures will result in train delays or cancellations, disruptions in stations operations, affect safety of the Crossrail railway or impact on the environment.
- Maintenance Data Forms, see Appendix 30B, require the *Contractor* to provide preventative maintenance data, including testing, on all Elements in his design.

- Maintainability Analyses, see Appendix 30C, require the *Contractor* to provide evidence that maintainability has been considered and optimised for all Plant in its design.

These documents shall contain an adequate level of detail which corresponds to the design progress for the 60% Design Gate Review.

4 weeks before the 90% Design Gate Review, the *Contractor* shall provide, for the acceptance of the *Project Manager*:

- Failure Data Forms, see Appendix 30A
These forms will provide a brief summary identifying potential failures for the Plant, Sub-Systems and Elementary Systems and identify if these failures will result in train delays or cancellations, disruptions in stations operations, affect safety of the Crossrail railway or impact on the environment.
- Maintenance Data Forms, see Appendix 30B, require the *Contractor* to provide preventative maintenance data, including testing, on all Elements in his design.
- Maintainability Analyses, see Appendix 30C, require the *Contractor* to provide evidence that maintainability has been considered and optimised for all Plant in its design.

These documents shall contain an adequate level of detail which corresponds to the design progress for the 90% Design Gate Review.

Prior to Completion, the *Contractor* shall compile the RAM Demonstration case comprising:

- The final update of the RAM assessment reports including an update of the RAM analyses (FMECA, RBD, Fault-Trees ...), origins of RAM data (usual databases, similar projects, industry, RAM testing) and degree of belief in the values
- RCI List and RAM Specification
- Completed and updated Failure Data Forms, Maintenance Data Forms and Maintainability Analyses
- DRACAS records. The details of each failure case shall include the following: time, date, duration of disruption, response time, recovery time, cause of incident, symptom, alarm, and remedial action taken etc
- High-level RAM performance statistics and comparison with the RAM targets
- Extrapolated reliability growth and remaining areas of uncertainty (e.g. limited amount of elapsed operating hours, testing conditions, limited item population)
- A summary of the RAM analyses and testing which highlights comparisons between results and targets, conclusions on the achievement of the requirements.

Table 2 : LV SUB-SYSTEMS RAM TARGETS

Sub-system	Operational Availability	Reliability	Maintainability
LV A or B single feed supply (output of main distribution board)	99.996 %	MTBSAF > 105,000 h	MART < 2 hours
LV A or B dual feed supply (input to local distribution)	99.999 %	MTBSAF > 1,000,000 h	MART < 2 hours
UPS backed-up and conditioned power supply (output of UPS distribution board)	99.99 %	MTBF > 80,000 h	MART < 4 hours
UPS Module Excluding batteries	99.996 %	MTBF > 175,000 h	MART < 4 hours

Legend :

- MTBF = Mean Time between Failures
- MTBSAF = Mean Time between Service-Affecting Failures
- MART = Mean Active Repair Time

Table 3 : TYPICAL FMECA WORKSHEET

Heading	Description
FMECA Ref	A unique identifier for the considered failure mode
Element Description	A brief description of the element being considered
Function Description	A brief description of the primary function of the element
Functional Failure Description	A brief description of the functional failure of the element under consideration
Failure Mode	The predicted or observed results of the failure cause on the considered element in relation to the operating conditions at the time of the failure



Failure Causes	Defects which are the underlying causes for the failure (during design, manufacturing or use)
Failure Effects	The potential consequences of each failure mode on the immediate surroundings of the equipment (local), wider sub-system/system (system) and the rail operations or potential escalation (escalation). Impact on rail or stations operations in terms of delays to rail services or closure should be provided where possible
Failure Management	<ul style="list-style-type: none"> ➤ Diagnostic A brief description of how the failure is identified ➤ Mitigation A brief description of any measures that could be taken to reduce/moderate the consequences of the failure
Severity Category	Severity category of each failure mode in accordance with defined severity classifications.
Frequency Category	Frequency category of each failure mode should be quoted in terms of Failures per hour (or mile) to assist with ranking and overall criticality classification. Where there is more than one identical failure mode in the system the frequency should be multiplied by the number of, to reflect the likelihood of any of these items failing in the system resulting in the identical effect on the railway.
Reliability Criticality Classification	Reliability related failure mode should be assigned a criticality rating based upon its frequency (F) and severity (S) categories in accordance with the defined criticality matrix.
Safety Criticality Classification	Any “safety related failure modes” should be marked in this column with “ SAFETY RELATED ”. Risk reduction for considered scenario shall be managed throughout System Safety Engineering processes.

Table 4 : FAILURE FREQUENCY SCALE

Likelihood	Frequency Category	Failure rate
Improbable	1	$< 10^{-6} \text{ h}^{-1}$
Unlikely (Low)	2	$\geq 10^{-6} \text{ h}^{-1}$ and $< 10^{-5} \text{ h}^{-1}$
Possible (Medium)	3	$\geq 10^{-5} \text{ h}^{-1}$ and $< 10^{-4} \text{ h}^{-1}$
Likely (High)	4	$\geq 10^{-4} \text{ h}^{-1}$ and $< 10^{-3} \text{ h}^{-1}$
Frequent (Very High)	5	$\geq 10^{-3} \text{ h}^{-1}$

Table 5 : OPERATIONAL SEVERITY

Operational Severity Levels		Railway Systems	Stations Building Services	Tunnels/Shafts/Portals Building Services
1	Negligible	Leading to train delays ≤ 2 minutes	Local Effect	Local Effect
2	Minor	Leading to train delays > 2 minutes and ≤ 5 minutes	Increased Pedestrian Journey Times	Could escalate to “Minor” or “Significant” effect on Railway Systems Operational Procedure to mitigate
3	Significant	Leading to train delays > 5 minutes and ≤ 10 minutes	<ul style="list-style-type: none"> ➤ Single Platform Closure ➤ Partial Station Closure after Mitigation Period (Operational Procedure) 	Could escalate to “Minor” or “Significant” effect on Railway Systems No Existing Mitigation
4	Major	Leading to train delays > 10 minutes and ≤ 15 minutes	<ul style="list-style-type: none"> ➤ Partial Station Closure ➤ Full Station Closure after Mitigation Period (Operational Procedure) 	Could escalate to “Major” or “Substantial” effect on Railway Systems Operational Procedure to mitigate
5	Substantial	Leading to train delays > 15 minutes or cancellations	Station Closure	Could escalate to “Major” or “Substantial” effect on Railway Systems No Existing Mitigation

Table 6 : CRITICALITY MATRIX

Frequency	Severity				
	5	4	3	2	1
5	Unacceptable	Unacceptable	Unacceptable	Unacceptable	Undesirable
4	Unacceptable	Unacceptable	Unacceptable	Undesirable	Undesirable
3	Unacceptable	Unacceptable	Undesirable	Undesirable	Tolerable
2	Unacceptable	Undesirable	Undesirable	Tolerable	Tolerable
1	Undesirable	Undesirable	Tolerable	Tolerable	Tolerable

30.3 Appendices

Appendix 30A Failure Data Form

Appendix 30B Maintenance Data Form

Appendix 30C Maintainability Analysis

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Part 31 – Electromagnetic Compatibility and Earthing & Bonding

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31.1 Introduction

The *Contractor* is responsible for the Electromagnetic Compatibility (EMC) and Earthing and Bonding (E&B) for all Plant, Material and Equipment provided as part of the *works* including any temporary Plant and Equipment.

The *Contractor* shall ensure that all components, sub-systems and systems provided are electromagnetically compatible and in particular the *Contractor* is responsible for:

- validation of the EMC performance of the *works*;
- co-ordination with Others to obtain relevant information to ensure the EMC of the *works*;
- appointment of an EMC specialist to lead these activities.

31.2 EMC Management Plan

The *Contractor* shall prepare and submit an EMC Management Plan to the *Project Manager* within 12 weeks of the *starting date*. The EMC Management Plan shall describe the *Contractor's* approach to EMC and E&B activities.

The *Contractor* shall declare within the EMC Management Plan the EMC and E&B standards applicable to the *works*, together with a justification as to why compliance with said standards will ensure that the *works* have a sufficient level of immunity and do not have a deleterious impact on, or are impacted by, the electromagnetic environment.

Where adequate standards do not exist the *Contractor* shall ensure that the *works* will not have an impact on or are impacted by the electromagnetic environment.

31.3 Standards

The *Contractor* shall comply with any mandated standards given in the Works Information and shall identify other applicable company, national and international EMC and E&B standards which shall be applied to the *works*.

31.4 Not Used

31.5 Interference mechanisms

The *Contractor* shall determine the extent of the electromagnetic environment that may impact the *works* by considering various types of interference mechanism such as: conducted interference (including transients), radiated interference, capacitively coupled interference, inductively coupled interference and electrostatic interference.

31.6 Site EMC Survey

Prior to the commencement of design and construction activities, an EMC survey shall be carried out by the *Contractor* where it is determined by the Site conditions that such survey is required in order to:

- Establish the background electromagnetic environment
- Ensure that the electromagnetic environment will have no adverse effects on the *works*.

The survey results shall be submitted to the *Project Manager*.

31.7 Electromagnetic compatibility of the works

The *Contractor* shall ensure that all components and sub-systems provided as part of the *works* are electromagnetically compatible.

The *Contractor* shall achieve this obligation through the application of the standards identified in the *Contractor's* EMC Management Plan, systematic design to ensure compliance with these standards and testing to demonstrate it. As part of this process, all normal operating modes and credible degraded operating modes of components and systems shall be considered.

The *Contractor* shall validate the EMC performance of the *works*. The *Contractor* shall identify and co-operate with Others to ensure electromagnetic compatibility of the Project.

31.8 Safety-related systems interference

The *Contractor* shall identify any safety related operations or activities and systems, whether part of the *works* or the interfacing safety related systems of Others that may be affected by the *works*.

Specific tests shall be designed to ensure that emissions from the *works*, whether conducted, induced, or radiated, conform to the specific requirements of these safety related systems. Adequate safety margins between the immunity levels of these safety related systems and the emission levels of Plant provided as part of the *works* shall be adopted and agreed with the *Project Manager* and Others.

31.9 Interference to/from existing adjacent railway infrastructure

The *Contractor* shall demonstrate by design and as agreed with the *Project Manager* verify by testing that the *works* shall not interfere with the correct operation of any nearby existing other railway infrastructure systems e.g. Network Rail, Docklands Light Railway (DLR), London Overground (RfL) or London Underground (LU). The *Contractor* shall also demonstrate that these existing railway infrastructure systems will not interfere with the *works*.

The *Contractor* shall gain the necessary approvals from relevant railway infrastructure operators prior to energising any Plant, Materials and Equipment and subsequently

carrying out tests. All supporting documentation shall be issued to the *Project Manager*.

31.10 Suppression of EMI and improvement of immunity

The *Contractor* shall provide all necessary suppression of EMI emitted by the *works* or shall undertake improvement of the *works* immunity including the provision of any additional hardware, firmware or software necessary.

When considering the extent of suppression of EMI or improvement of the *works* immunity required, the *Contractor* shall provide computations of expected conducted and radiated emissions from Plant provided as part of the *works* due to normal operation and credible degraded modes for example, electrical fault, load fluctuations, system imbalance.

The *Contractor* shall particularly determine the effects of EMI on safety-related Plant and Equipment where relevant, especially the probabilities of leading to an unsafe (wrong side failure) operation. The output of any computer modelling shall be included in the final System EMC Test Report relating to the *works*.

31.11 Earthing

The *Contractor* shall comply with the *Employer's* E&B Strategy, C124-MMD-O8-XST-CR001-00002 given in Volume 2C of the Works Information, where it is relevant to the *Contractor's* system earthing design.

The *Contractor* shall design and implement an earthing system in relation to the *works* and deliver the following minimum requirements:

- Protect personnel, installations and equipment from electrical hazards, including lightning, where relevant.
- Reduce potential to system neutrals.
- Reduce or eliminate the effects of electrostatic interference and electromagnetic interference arising from within the Project.
- Provide a single-point earthing method for all parts of the *works* such as: enclosures, cabinets, drawers, assemblies and sub-assemblies.
- Provide a clean zero-volt reference point for signals in sensitive electronic Plant, Material and Equipment.

The earthing system shall serve as a common voltage reference and to contribute to the mitigation of disturbances. The potential differences (touch and step voltages) between any two accessible points shall be as low as reasonably practicable. The earthing system should be designed to minimise the noise voltage generated by currents from two or more circuits flowing through a common earth impedance and to avoid creating earth loops susceptible to magnetic fields and differences in earth potentials in accordance with BS EN 50122-1 and BS EN 62305.

31.12 Bonding

The *Contractor* shall provide bonding in relation to the *works* for all exposed metallic parts of all Plant, Materials and Equipment and shall connect each item to the appropriate earthing network so as to minimise potential differences in accordance with BS EN 50122-1 in order to achieve safety requirements and minimise noise voltage.

The *Contractor* shall comply with the *Employer's* E&B Strategy, C124-MMD-08-XST-CR001-00002, where it is relevant to the *Contractor's* system bonding design.

Direct bonding shall be provided by the *Contractor* wherever practical. Where indirect bonding via bonding straps, are used, to connect two isolated items, the bond shall be in accordance with recognised international standards, for example IEC 1000-5-2.

31.13 EMI Hazard Analysis/Log

The *Contractor* shall carry out an EMI Hazard Analysis. This analysis shall identify:

- All Plant/Materials/Equipment/Systems, including that of Others, that are susceptible to or are a source of EMI;
- The likely interference mechanisms;
- The likely consequences if interference takes place;
- The proposed EMI mitigation measures if required.

The EMI Hazard Analysis shall address intra-system compatibility of the *Contractor's* systems and inter-system compatibility between the *works* and other interfacing parties' systems. The EMI Hazard Analysis shall be submitted to the *Project Manager* within 24 weeks of the *starting date*.

An EMI Hazard Log shall be maintained by the *Contractor* either as a stand-alone log or as part of the Project Wide Hazard Record and shall be submitted to the *Project Manager* when requested.

31.14 Testing

The *Contractor* shall carry out all necessary tests to demonstrate that all components and systems provided as part of the *works* do not have an impact on or are impacted by the electromagnetic environment. No post hoc addition or removal of components, rework or on-site remedial work to facilitate passing of EMC tests shall be permitted without the *Project Manager's* acceptance.

The *Contractor* shall produce an EMC Test Plan, to be submitted to the *Project Manager*, at least 12 weeks in advance of any EMC testing. The EMC test plan should detail the tests to be carried out and the management of these tests. The testing shall follow the process given in Works Information Volume 2B, Part 28 – Testing and Commissioning Process.

The *Contractor* shall notify the *Project Manager* of the proposed test dates at least 10 working days before any testing is due to commence.

The certification and test results are to be compiled into EMC equipment test reports and consolidated into a final System EMC Test Report on completion of all the system EMC tests. The EMC equipment test reports are to be submitted for review to the *Project Manager*.

Where the system is too large, or no relevant international or national EMC standards exist the *Contractor* may follow a Technical Construction File (TCF) route. The TCF shall describe the Plant that shall form part of the *works* and set out procedures used to ensure the Plant conforms to specified EMC requirements as detailed in the *Contractor's* EMC Management Plan. The TCF shall be developed by the *Contractor* and shall demonstrate EMC compliance. Prior to Completion the *Contractor* shall submit the TCF to the *Project Manager* for acceptance

The *Project Manager's* acceptance of the TCF does not relieve the *Contractor* of its responsibility to carry out all necessary on-site tests, nor to take any remedial steps to ensure EMC when the *works* are commissioned.

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Part 32 – *Contractor's* Engineering Safety Management Requirements

32.1 Introduction

This Part of the Works Information defines the requirements for engineering safety management (ESM) activities to be carried out by the *Contractor* to assure the safety of the Elementary Systems of the *works*

These ESM requirements apply specifically to the design engineering and provision of electrical, electronic and programmable electronic systems and railway mechanical systems. They are not relevant to civil engineering design and construction related activities where the *Contractor* has justified to the *Project Manager* within the *Contractor's* System Safety Plan that operational, maintenance and emergency safety will be adequately assured under the application of the Construction Design and Management (CDM) Regulations.

This document explains the engineering safety deliverables, and level of cooperation required from the *Contractor* to assist the *Project Manager*, the *Employer* or Others to secure safety authorisation to operate the railway in accordance with the applicable railway safety legislation.

32.2 Not Used

32.3 Not Used

32.4 System Safety

32.4.1 General Engineering Safety Management Requirements

The *Contractor* is responsible for the assurance of the adequacy of safety for the Elementary Systems of the *works*. This shall have regard to:

- normal, degraded and emergency operating modes;
- maintenance of the systems; and
- application conditions and environment of the Crossrail railway.

The *Contractor* shall provide to the *Project Manager* all necessary evidence of safety adequacy to assist the *Project Manager*, the *Employer* or Others to secure safety authorisation to operate the railway in accordance with the relevant railway safety legislation. To facilitate this, the *Contractor* shall be required to make presentations to and secure acceptance of the evidence of engineering safety from the *Project Manager*, prior to seeking approval from the appropriate approval bodies.

- In Providing the Works the *Contractor* shall implement an engineering safety management system consistent with that of the *Employer*.

How the *Employer's* System Safety Plan is to be implemented on the Project is explained in the "Crossrail Engineering Safety Management Reference Manual" which will be provided for guidance to the *Contractor* by the *Project Manager* within 4 weeks of the *starting date*.

32.4.2 Engineering Safety Competency

The *Contractor* shall demonstrate to the satisfaction of the *Project Manager* that individuals involved in demonstration of safety adequacy of the Elementary Systems are suitably qualified and experienced..

32.4.2.1 Engineering Safety Manager

The *Contractor* shall appoint an appropriately experienced and competent Engineering Safety Manager who shall be responsible for the management, coordination, quality control and assurance of the *Contractor's* engineering safety management activities. The *Contractor* shall submit the CV of the Engineering Safety Manager to the *Project Manager* for acceptance. The accepted Engineering Safety Manager will serve as the primary interface with the *Project Manager* on engineering safety matters.

32.4.2.2 .Competency of Engineering Safety Assessors:

The *Contractor* shall ensure that only qualified and competent professional assessors undertake engineering safety assessment activities. The *Contractor's* engineering safety organisation shall be explained in the *Contractor's* System Safety Plan, and it shall have suitable independence from the design and commercial delivery activities.

The *Contractor* shall maintain an engineering safety staff competency matrix indicating the roles and responsibilities and records of individual's competencies for review by the *Project Manager* upon request.

32.4.3 Demonstration of Safety Adequacy

Demonstration of safety adequacy of the Elementary Systems shall be carried out in compliance with:

- 2009/352/EC EC Commission Regulation – Common Safety Method on Risk Evaluation and Assessment (CSM Regulation); and
- ORR Sep 2010 Guidance on the Application of the Common Safety Method on Risk Evaluation and Assessment;

and, where applicable:

- BS EN 50126 -1: 1999, 'Railway applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)';
- BS EN 50128: 2011, 'Railway applications – Communication, signalling and processing systems – Software for railway control and protection systems';
- BS EN 50129: 2003, 'Railway applications – Communication, signalling and processing systems – Safety related electronic systems for signalling';
- BS EN 61508: 2003, 'Functional safety of electrical/electronic /programmable electronic safety-related systems' – all parts.

The *Contractor* shall prepare Engineering Safety Justifications for the Elementary Systems within the scope of the *works* based on application of the CSM Regulation.

32.4.3.1 Application of Common Safety Method Regulation (CSM Regulation)

Guidance on how the *Contractor* shall apply the CSM Regulation to the *works* is given in the “Crossrail Engineering Safety Management Reference Manual” which will be provided by the *Project Manager* within 4 weeks of the *starting date*. The approach is summarised below:

The CSM Regulation, and supporting ORR guidance, advises that hazards can be analysed and evaluated by a combination of one or more of the basic principles given below.

A: Application of Codes of Practice

- The *Contractor* shall demonstrate that the Elementary Systems comply with the relevant codes of practice, standards and specifications (e.g. NR, LUL BS, and EN) in accordance with Part 29, Non-compliances are to be identified and safety justified by the *Contractor*.
- If, and where, the RIRs apply, conformance with the relevant Technical Specifications for Interoperability (TSIs) and Notified National Technical Rules (NNTRs) will be advised in the Technical File relating to the Elementary System. In accordance with Works Information Volume 2A – Particular Requirements, Scope of Works the evidence of conformity will be made available by the *Project Manager*.

B: Comparison with Similar Systems (Reference System)

- Where reasonably practicable, the preference is to use railway proven, tried and tested components, Plant and Materials, Equipment and systems (i.e. reference systems). The *Contractor* shall prepare a Product Breakdown Structure, for acceptance of the *Project Manager*, to demonstrate the pedigree of proven use of reference systems prior to their procurement.
- In the event of components, Plant and Materials, Equipment or systems being proposed by the *Contractor* have no obvious proven use (i.e. not a reference system) then the *Contractor* shall advise the *Project Manager*, and the necessary evidence shall be provided by the *Contractor* to secure approval for use from the relevant acceptance bodies in advance of finalising the design. For new, novel, high risk or bespoke design proposals the *Contractor* shall propose in its System Safety Plan, for agreement of the *Project Manager*, where the *Contractor* is to evidence this via preparation of appropriate Product Safety Case(s).

C: Explicit Risk Estimation

- The *Contractor's* design shall be subject to a suitable and sufficient depth of hazard identification, risk estimation and evaluation by the *Contractor* depending on the magnitude of the perceived safety risk, whether the risk is new/novel, and complexity of the system design (e.g. bespoke design). The *Contractor's* estimation and evaluation shall confirm risks are either eliminated or controlled to as low as reasonably practicable (ALARP).
- For the majority of systems the risk estimation and ALARP justification shall follow a recognised risk matrix approach. However, for high risk (e.g. where the unavailability of the system safety function is judged immediately life threatening), new/novel, complex or bespoke design the *Contractor* may be required by the CSM Regulation to undertake a full, in depth, quantitative safety analysis.

- All hazard identification, risk estimation and evaluation will be recorded and monitored to successful resolution by the *Contractor* in the Project Wide Hazard Record (PWHR) relating to the contract.

32.4.4 System Safety Requirements

Outlined below is the process whereby the key system safety requirements are to be demonstrated by the *Contractor*.

32.4.4.1 Safety Requirements Specification

The *Contractor* is to prepare a System Safety Requirements Specification for acceptance by the *Project Manager*; the document shall be derived from the Works Information as described in section 32.5 and Appendix 32A

The *Contractor* may chose, with prior agreement of the *Project Manager*, to identify safety requirements as part of the overall system requirements traceability strategy for the *works* and not prepare a separate System Safety Requirements Specification. This shall be explained in the *Contractor's* System Safety Plan.

Successful delivery of the identified safety requirements is to be traced by the *Contractor* through to Completion.

32.4.4.2 Project Wide Hazard Record

The outcome of preliminary hazard analysis by the *Employer* is recorded in the preliminary Project Wide Hazard Record (PWHR), which is provided with Works Information Volume 2C – Specifications and Reference Design. The *Contractor* is required to adopt and develop the preliminary PWHR as the principal engineering safety hazard management tool (i.e. hazard log).

The preliminary PWHR is supported on a web based database. The *Contractor* shall use the web based database to maintain the PWHR, the *Project Manager* will provide the *Contractor* with the necessary process procedure, access and training in its use web based software.

32.4.4.3 Safety Integrity Levels

Depending on the depth of application of the Common Safety Method Regulation (2009/352/EC) (CSM Regulation) the *Contractor* may be required under the Regulation to undertake a full quantitative safety analysis in support of explicit risk estimation. Should this be the case, the *Contractor* shall prepare for acceptance of the *Project Manager*, a Safety Integrity Level (SIL) Requirements Report, to recommend the system safety performance requirements against which the quantitative safety analysis will be evaluated. The identification of appropriate SILs is the responsibility of the *Contractor*, and shall be in accordance with the requirements of BS EN 50126 and BS EN 61508.

A preliminary evaluation of the SIL requirements for the Elementary Systems of the *works* is provided with Works Information Volume 2C – Specifications and Reference Design.

32.4.5 Operations and Maintenance

The *Contractor* shall ensure that the *works* are consistent with the mode of operation (normal, degraded and emergency) and maintenance defined by the *Employer's* requirements, and including the Crossrail Concept of Operations.

It is expected the *Contractor* will run appropriate HAZOPs, or similar studies involving the *Project Manager* and Others, to ensure operational and maintenance safety issues are adequately addressed.

32.4.6 System Interfaces

The *Contractor* will prepare an Interface Hazard Analysis (IHA) to confirm the engineering safety implications at internal and external interfaces have been adequately addressed and managed. The IHA will involve the *Project Manager* and Others.

The IHA will take cognisance of the Systems Engineering requirements related to the management of interfaces described in Part 29..

32.5 Safety Deliverables

The required evidence of safety adequacy of the Elementary Systems shall be provided by the *Contractor* via the schedule of safety deliverables listed in Appendix 32A. It is accepted that not all safety deliverables may be relevant to the *works*. The *Contractor* shall include in the System Safety Plan a listing of the safety deliverables to be prepared.

Preliminary timescales and responsibilities for preparation and acceptance of the safety deliverables are summarised in Appendix 32C.

32.5.1 System Safety Plan

Within 8 weeks of the *starting date* the *Contractor* shall produce a System Safety Plan, which shall describe the *Contractor's* engineering safety management strategy for the *works* and submit it to the *Project Manager* for acceptance. In the case of the first submission of the System Safety Plan the *Project Manager* replies within 4 weeks of the date of submission. The System Safety Plan shall be prepared by the *Contractor* in accordance with the contents advised in Appendix 32B.

32.5.2 System Software Safety Plan

If significant software development or modification is proposed as part of the *works* then the *Contractor* shall prepare a System Software Safety Plan in accordance with the requirements of BS EN 50128 and submit it to the *Project Manager* for acceptance. The System Software Safety Plan shall list the proposed software safety deliverables for the *works*.

Where there is no proposed software development, or the software development or modification is minimal and not safety significant then the *Contractor* may judge a System Software Safety Plan is not required. This shall be clearly explained in the *Contractor's* System Safety Plan, along with the *Contractor's* processes to assure continuation of software safety.

32.5.3 Independent Review/Assessment

32.5.3.1 Independent Safety Assessment

The *Contractor* shall have carried out independent review of Product Safety Cases, where these are prepared, by an Independent Safety Assessor (ISA). An ISA review is required for Engineering Safety Justification(s) prepared by the *Contractor*,

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unless agreed otherwise by the *Project Manager*. These arrangements shall be described in the *Contractor's* System Safety Plan.

The *Contractor* shall propose an ISA to the *Project Manager* for acceptance.

The findings of the ISA shall be formally reported and made available to the *Project Manager* within 4 weeks of the Independent Safety Assessment being completed.

32.5.3.2 Independent Software Assessment

If significant software development or modification is proposed as part of the *works* the *Contractor* shall undertake an independent review of software development by an Independent Software Assessor (ISWA) in accordance with the requirements of BS EN 50128. These arrangements shall be described in the *Contractor's* System Software Safety Plan.

The *Contractor* shall propose an ISWA to the *Project Manager* for acceptance.

The findings of the ISWA shall be formally reported and made available to the *Project Manager* within 4 weeks of the Independent Software Assessment being completed.

32.5.3.3 Independent Assessment Body

In accordance with the CSM Regulation the *Employer* will appoint an Independent Assessment Body (AsBo) to confirm the *Contractor's* engineering safety assurance of the Elementary Systems is in conformance with the principles of the Regulation.

The *Contractor* is to fully cooperate with the AsBo, provide the engineering safety evidence necessary to carry out this assessment, and comply with any improvements to assure the *Contractor's* conformance with the CSM Regulation.

32.6 Programme, Monitoring and Auditing

A preliminary schedule for preparation and the approval route of the required engineering safety deliverables is given in Appendix 32C.

The *Contractor* shall integrate the preparation of safety deliverables into the Accepted Programme.

In accordance with Part 29, the *Contractor* is to facilitate fortnightly design progress meetings with the *Project Manager*, where engineering safety management shall be an agenda item. The *Contractor's* Engineering Safety Manager and the *Project Manager's* ESM representative shall attend these meetings, where requested, and if there are significant engineering safety issues to discuss.

The status of engineering safety management activities shall be included in the *Contractor's* monthly progress report. The *Contractor* shall ensure that engineering safety management auditing is considered within the overall Quality Assurance auditing programme for the *works* as described in Part 20. These arrangements shall be confirmed in the *Contractor's* System Safety Plan.

32.7 Engineering Safety Relationships

The *Contractor* shall within its System Safety Plan describe how the relationships with the aspects of the Works Information listed below are to be managed and coordinated.

32.7.1 RAM (Reliability, Availability and Maintainability)The *Contractor* is to explain how the commonality between engineering safety and RAM (Part 30) is to be managed in line with BS EN 50126.

32.7.2 EMC (Electromagnetic Compatibility)The *Contractor* shall explain how potential safety risks resulting from electromagnetic interference (EMI)(Part 31) are adequately managed and mitigated.

32.7.3 Health & Safety (CDM Regulations)

The *Contractor* shall identify and explain those civil engineering and other elements of the *works* where the operational, maintenance and emergency safety will be assured under the application of the Construction Design and Management (CDM) Regulations.

Where operational and maintenance risks are identified within the CDM Risk Register, these shall be included in the PWR for the *works* and cross-referenced.

32.7.4 Human Factors

The *Contractor* shall explain how any Human Factors analyses (Works Information Volume "A") will be accounted for within the engineering safety management activities.

32.7.5 Testing and Commissioning

The *Contractor* shall explain how the safety of the Elementary Systems is to be demonstrated prior to testing and commissioning activities (Part 28).

32.7.6 Interoperability

The *Contractor's* responsibilities regarding application of the Railway Interoperability Regulations (RIR) to the central section of the Crossrail Project are described in Works Information Volume 2A – Particular Requirements, Scope of Works.

32.8 Appendices

Appendix 32A	Engineering Safety Deliverables
Appendix 32B	Content of System Safety Plan
Appendix 32C	Programme of Engineering Safety Deliverables

Glossary

Acceptance Certificate (AC)	the certificate issued by the <i>Contractor</i> when an Elementary System is completely tested.
Access Code	The code governing rights of access to the Underground Network as amended from time to time, a copy of which is included in Appendix 11H hereto.
Agreed Defects Listing	An agreed listing of Defects specifically established between the <i>Contractor</i> and the <i>Supervisor</i> for an element of the work that is to be taken over by the <i>Employer</i> .
ARM	Active Risk Manager
AWF	LUL Application to Work Form
Apprentice (existing)	An individual already undertaking an accredited apprenticeship scheme within the company who is employed for a minimum of 16 hours a week who is undertaking a sector skills council / standard setting body recognised structured programme of training leading to the completion of a full apprenticeship. Where an existing apprentice spans across several years it will be considered as 0.5 SLNT outputs i.e 3 year existing apprenticeship = 1.5 SLNT outputs. An apprentice must be employed on the contract in the Working Areas for a minimum of 4 months in each year to qualify as 0.5 SLNT training output.
Apprentice (new)	An individual employed for a minimum of 16 hours a week who is undertaking a sector skills council / standard setting body recognised structured programme of training leading to the completion of a full apprenticeship. Where an apprenticeship spans across several years, each year shall be considered one SLNT output i.e. 3 year apprenticeship= 3 SLNT outputs. An apprentice must be employed on this contract as a new apprentice and be in the Working Areas for a minimum of 4 months in each year to qualify as 1 SLNT training output.
Approved Works	Works Documents agreed between the Employer, the Project Manager and LUL for each Work Package.

Documents	
ATC System	The automatic train control and signalling system for the Railway.
ATC System Works Contractor	Thales, the DLRL Franchisee and/or other subcontractor employed by Dockland Light Railway Limited to carry out ATC System Works.
BAA	British Airport Authority
Bank Holiday	A day other than a Saturday or Sunday on which clearing banks are not open (other than by reason of a strike, lock out or other stoppage affecting such banks) for business in the City of London.
Bank Holiday Possession	Any Possession granted either: <ul style="list-style-type: none"> • between 01:30 hours on a Friday which is a Bank Holiday and 04:30 hours on the next Monday; or • between 01:30 hours on a Saturday and 04:30 hours on the next Tuesday including a Monday which is a Bank Holiday; or • between such other times as DLR may stipulate that include Bank Holiday.
Baseline Accepted Programme	[Part 14 – Management]
BREEAM	[Part 21 – Environmental Management]
BWB	British Waterways Board
CAD	Computer Aided Design and/or Draughting.

CAD Data	All electronic files and associated resources that make up the content within and the output from, the CAD Drawings, CAD Models and CAD Object Orientated Model files that pertain to the <i>works</i> .
CAD Drawing	A type of CAD Data file that is held within ECMS comprising content and one or more reference files. It is a representation of a Drawing and is saved and stored in a manner that allows reproduction of that Drawing.
CAD Model	A type of CAD Data file that is held within ECMS and comprises of content and other source files held within ECMS. This file is typically two dimensional (2D) when it is a reference file to a CAD Drawing. This file is typically three dimensional (3D) when it is used as a source file to a 2D CAD Model.
CAD Object Orientated Model	a type of CAD Model where the CAD Data file contains discipline specific building and construction components and systems, and/or objects that have attributes and relationships to other objects. This file is typically produced by a discipline specific CAD Object Orientated Modelling software application.
CAD Standard	the <i>Employer's</i> document (CR-STD-005) that sets out the requirements for CAD Data held within ECMS.
CDO	Concept Design Overview. Provides an overview of the design concept for an entire Crossrail station, running tunnel, shaft or portal.
CDS	Concept Design Statement. Describes the concept design of some or all of the assets within that station, running tunnel, shaft or portal.
Clause	A Clause under the <i>conditions of contract</i> .
Closure and Possession Plan	The closure and possession plan relating to LUL assets, if any, included in Volume 2A of the Works Information unless later changed in accordance with this contract.

CMDL	Contract Master Deliverables List
Code of Accounts	[Part 14 – Management]
Commissioning Lots	is an assembly as part of a Sub-system that can be tested independently of other assemblies as a functioning unit
Commissioning Logic	Is when the commissioning test activities have been listed on test data sheets and linked together in a logical manner ensuring that the sequences and interdependencies of activities are recognised.
Commissioning Schedule	Where the Commissioning Logic is established, each test activity is given an estimated duration and is reviewed from the resource viewpoint. By analysing the results and carrying out a number of reconciliations to decide on the optimum numbers of, inter alia, personnel, test sites, items of Plant and Materials, the Commissioning Logic is converted into the Commissioning Schedule
Commitments Delivery Tracker (CDT)	[Part 4 – Undertakings and Assurances] System used by the <i>Employer</i> to monitor performance in regard to Undertakings and Assurances.
Common Design Item	A 3D CAD Model, and where appropriate an associated 2D CAD Model representation, compliant with the CAD Standard, which represents an asset that will be used across multiple locations in the <i>works</i> .
Common Design Library	A library of Common Design Items which is updated by the <i>Employer</i> .
Community Investment Programme	Where the <i>Contractor</i> optimises, wherever possible, any opportunities to bring benefits to the local community in addition to the benefits delivered as a result of the Responsible Procurement obligations in this Works Information.

Competent Authority	means any local, national or supra-national agency, authority, department, inspectorate, minister, ministry, official, court, tribunal or public or statutory person (whether autonomous or not), whether of the United Kingdom or of the European Union, which has jurisdiction over either Network Rail or the <i>Employer</i> , or the <i>Contractor</i> or any consultant or Subcontractors.
Conceptual Design Statement (CDS)	A technical submission designed to obtain Approval in Principle (AIP) from LUL for a given package of interface work. CDS are governed by LUL Standard 1-538 assurance. Depending upon the significance of the Interface Works a CDS may be required as part of a 'Works Package Plan' and/or 'Execution Plan' submission.
Confined Spaces Regulation	The Confined Spaces Regulation 1997 and any associated codes of practice and the like.
Consents	means all town planning, environmental and traffic permissions, approvals, permits, licences, or authorisations required from a consent granting body in order to undertake and complete the <i>works</i>
Constructing Better Health Standards (CBH)	
Construction/Commissioning Railway Rulebook	Is the rulebook developed by the C610 Systemwide Main Works Contractor in accordance with paragraph 28.5.7 of this document.
Construction Phase Plan	[Part 19 – Health and Safety]
Contactless Smartcard	[Part 16 – Security]
Contract	A document setting out how the quality requirements of the Contract, as specified in the Works Information, shall be achieved, controlled, assured,

Quality Plan	demonstrated and managed.
Contractor's Consents	means all of the Consents that are not <i>Employer's</i> Consents
Corrective Action Report (CAR)	Raised to record a failure to implement a specified process or contractual requirement. Generally identified during an audit.
CPFR	Crossrail Project Functional Requirements
CRF	LUL Closure Request Form
Crossrail Baseline Standards	The register of Standards for undertaking works for the Project as issued and amended from time to time by CRL.
Crossrail Act 2008	The Crossrail Act 2008 is a hybrid bill that empowers the Nominated Undertaker to construct and operate Crossrail. The Secretary of State has appointed the <i>Employer</i> as a Nominated Undertaker for the Crossrail Programme
Crossrail Complaints Commissioner	[Part 9 – Community Relations]
Crossrail Golden Rules	Health and safety rules that apply to everyone involved in the Project.
Crossrail Noise and Vibration Mitigation Scheme	[Part 21 – Environmental Management]
Crossrail Public Helpdesk	Helpdesk setup and maintained by the <i>Employer</i> to manage all <i>works</i> related complaints and enquiries from the public.

Crossrail Trend Program	Used for early identification of variances from cost and schedule baselines
CWG	Canary Wharf Group.
DCC	Design and Compliance Certificate
DCPC	Driver Certificate of Professional Competence
Depot Change	The procedure contained in Part C of the Depot Access Conditions.
Depot Access Conditions	The National Depot Access Conditions (December standard 1996) together with the depot specific annexes applicable to any relevant depot which is the subject of, or relates to, the Development Services and/or Project, or any replacement of, or amendment to, the same from time to time.
Design Data	All drawings, reports, documents, plans, software, formulae, calculations, method statements and other data whatsoever in any medium prepared by the <i>Employer</i> or the <i>Contractor</i> relating to the design and construction of the Relevant Works
Direction	<p>Any direction, requirement, instruction or rule legally binding on either Network Rail or the <i>Employer</i> and includes any modification, extension or replacement of any such direction, requirement, instruction or rule for the time being in force, but shall not include:</p> <p>(a) the exercise of a discretion under any contract or other obligation binding on the party in question or the enforcement of any such contract or obligation; or</p> <p>(b) any discretion issued by the ORR pursuant to section 16A of the Railways Act 1993.</p>
Diverse Suppliers	<p>as defined by EU Recommendation 2003/361/EC</p> <p>&</p> <p>TFL Supplier Diversity Definitions 260210</p>

	<ul style="list-style-type: none"> • Small and Medium Enterprises; <ul style="list-style-type: none"> ▪ Small Enterprise is a business which meets at least two of the following criteria: <ul style="list-style-type: none"> (a) Turnover per annum of up to £5.6 million; (b) Balance Sheet total of no more than £2.8 million; and (c) 50 employees or fewer. <p>Note: The criteria in (b) and (c) will also be applied to group accounts where the turnover for the group does not exceed the figure stated in (a).</p> <p>A Medium Enterprise is a business which meets at least two of the following criteria:</p> <ul style="list-style-type: none"> (a) Turnover per annum of up to £22.8 million; (b) Balance Sheet total of no more than £11.4 million; and (c) 250 employees or fewer. <p>Note: The criteria in (b) and (c) will also be applied to group accounts where the turnover for the group does not exceed the figure stated in (a).</p> • Black, Asian and Minority Ethnic businesses; <p>Are those in which 51% or more of the share capital is owned by members of one or more Minority Ethnic Groups.</p> • Suppliers from under-represented or protected groups; <p>Suppliers from other under-represented groups are those in which 51% or more of the share capital is owned by members of one or more of the following groups under the headings below (where not covered by previous definitions):</p> <ul style="list-style-type: none"> (b) Gender - Women (c) Disability - People with mobility and sensory impairments, people with mental health issues, people with learning difficulties and people with other hidden impairments. (d) Sexual orientation- Lesbians, gay men, bisexual and transgender people (e) Age - Older people (aged 60 or over), young adults (aged 24
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	<p>or under)</p> <p>A supplier from a protected group is one which is 51% or more owned by members of a group for which protection is provided by anti-discriminatory legislation.</p> <ul style="list-style-type: none"> • Suppliers demonstrating a diverse workforce composition. <p>Suppliers demonstrating a diverse workforce composition are those having a workforce composed of 51% or more of people from one or more minority ethnic groups and/or under-represented and/or protected groups as defined above.</p>
DLR, DLRL	Docklands Light Railway Limited whose registered office is at Operations and Maintenance Centre, P.O. Box 154, Castor Lane, Poplar, London E14 0DX.
DLR Concessionaire	Any concessionaire with whom DLR has contracted or may contract with from time to time to design, build and maintain any part of the Railway.
DLR Contractors	Any DLR Concessionaire, the DLR Franchisee or any other contractor appointed by DLR in connection with the Railway (including any ATC System Works Contractor)
DLR Franchisee	Serco Limited (Company No 00242246) or such other person as DLR may appoint to undertake the operation of the Railway from time to time.
DLR Standards and Procedures	DLR's Standards and Procedures referenced in the Crossrail Standards Baseline or later incorporated by <i>Project Manager's</i> instruction.
Drawing	a self contained electronic file that is an exact representation of the corresponding printed paper, as submitted through EDMS.
Drug and Alcohol	[Part 19 – Health and Safety]
Dynamic Tests	Means the stage of testing that requires the movement of trains to demonstrate those functions that cannot be fully demonstrated by static testing alone as part of the Assurance Process..

Electronic CAD Management System (ECMS)	the <i>Employer's</i> collaborative system used for the integrated management and production, of all CAD Data. This system facilitates the design review of CAD Data by the <i>Employer</i> and automatically transfers Drawings into EDMS.
EDMS	Electronic Document Management System
Elementary Systems	the top level of sub-division of the various systems that make up the Crossrail railway system, e.g. track, signalling, fire main system, etc..
employees	For the purposes of Part 23 means any employees, directly employed by the <i>Contractor</i> or by subcontractors or suppliers of any tier working for the <i>Contractor</i> to Provide the Works.
employers	For the purposes of Part 23 means the <i>Contractor</i> and subcontractors or suppliers of any tier who are engaged directly or indirectly by the <i>Contractor</i> to Provide the Works
Engineering Hours	The period between 01:30 hours and 04:30 hours on any day from Tuesday to Saturday inclusive, between 01:30 hours and 05:30 hours on any Sunday and between 00:30 hours and 04:30 hours on any Monday.
Engineering Hours Possession	Any Possession granted during Engineering Hours.
Ethnic Classification Groups	<p>as defined in: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/Browsable/DH_5319155</p> <ul style="list-style-type: none"> • White British • Irish • Any other White background • Mixed White & Black Caribbean • White & Black African

	<ul style="list-style-type: none"> • White & Asian • Any other Mixed background • Asian or Asian British Indian • Pakistani • Bangladeshi • Any other Asian background • Black or Black British Caribbean • African • Any other Black background • Chinese or other Ethnic Group Chinese • Any other Ethnic Group
EPPR	Engineering Progress and Performance Report, the detailed implementation schedule for engineering.
Execution Plan (EP) Submission	The detailed technical submission to LUL intended to satisfy them that, prior to construction, the <i>Employer's</i> proposals for the LUL Interface Works do not prejudice the safe operation of the Underground Network.
External Facility Networks	non-railway networks such as networks operated by utility companies.
FAC	Factory Acceptance Certificates
FAT	Factory Acceptance Tests
FDS	Final Design Submission
FORS	Freight Operator Recognition Scheme

Four Week Rolling Programme	[Part 14 – Management]
Four Weekly Dashboard Report	[Part 14 – Management]
Framework Asset Protection Agreement (Framework APA)	The Agreement entered into between the <i>Employer</i> and Network Rail to facilitate the undertaking of those parts of the <i>works</i> located over, under, alongside or on the Railway which Network Rail determines might reasonably affect the safety and operation of the Railway.
Freight Operating Company (FOC)	A company whose business includes the transportation of freight by rail and with whom Network Rail have an agreement specifying minimum rights of access to the Network.
Government Security Agencies	[Part 16 – Security]
Graduate Training Scheme	An individual employed for 16 hours a week or more who has recently completed their undergraduate degree and is beginning an employment position on a formal graduate trainee scheme with a minimum duration of 6 months.
Group Standards	Technical standards to which railway assets or equipment used on or as part of the Network must conform and operating procedures with which operators of railway assets must comply, in each case as issued by the Rail Safety and Standards Board Limited and authorised pursuant to the Railway Group Standard Code.
Highway	The term “Highway” wherever used, includes the term “road”, “street”, “lane” and where relevant any adjoining “footway” or “footpath”.
Highways Agency	[Part 5 – Utilities]

Highway Authority Agent	The maintaining agent responsible for everyday management of a Local Highway Authority's road network.
Highway Works	Those activities necessary to perform the scheduled works, ancillary works and highway works as defined in Schedules 2, 3 and 17 of the Crossrail Act 2008.
HAUC	Highway Authorities and Utilities Committee
Hazard Logs	[Part 7 – Permanent works design]
Hold Points	[Part 20 – Quality Management]
HSE	Health and Safety Executive
IEMA	Institute of Environmental Management and Assessment
IFC	Information For Construction.
IM Works	A part of the <i>works</i> which when complete will constitute assets and systems that will be handed over to an Infrastructure Manager (IM) to own, maintain and operate. e.g. In simple terms LUL will be the IM for most of the Crossrail Stations and Network Rail the IM for the tunnels and railway systems.
IMS-RIVO Safeguard	Incident management system used for notification, reporting, recording and tracking actions and close out of Incidents.
Incident	an unplanned, undesired event that resulted in (or could have resulted in) harm to people; damage to or loss of, property; or harm or damage to the environment, or the potential for regulatory action or significant disruption or reputational damage to the Project.
inclusivity	means proactively seeking to address the barriers to participation in the Project, whether as employees, customers or other stakeholders, by all members of the community whatever their identity or access needs.

Industry Partners	means each of Network Rail, LUL, CWG, Berkley Homes, BAA, DLRL and BWB
Information Sheets	[Part 9 – Community Relations and Publicity]
Infrastructure Maintenance Contractor (IMC)	The relevant contractor employed by Network Rail to maintain, renew and repair parts of the Network.
Infrastructure Manager	Has the meaning ascribed to an Infrastructure Manager under the Railways and Other Guided Transport Systems (Safety) Regulations 2006.
IRD	Incident Response Desk
IRF	Inspection Request Form
Inspection & Test Plans (ITPs)	Plans specifying the activities required to establish whether product conformity is achieved. They identify the responsibilities for executing the activities, the documents controlling them and the records required. These are prepared to support the Contract Quality Plan for a particular element of the <i>works</i> .
Installation Release Notice (IRN)	the document issued by the <i>Contractor</i> certifying its installation and formalising the transfer of responsibility for part of a system (Commissioning Lots) from installation to commissioning.
Integrated Works Programme	The integrated programme for the delivery of the Replacement Works and the Interface Works.
Intermediate Shafts	[Part 28 – Testing and Commissioning]
IRAF	Incident Response Arrangements Form

Isolation	Planned arrangements for a predetermined period for the interruption of traction electricity between defined locations.
Jobs Brokerage	A brokerage which will work with local employment agencies and unemployment programmes such that as vacancies arise in respect of the contracted workforce for the contract, the local community are targeted and made aware of these opportunities to ensure that the contract workforce becomes increasingly reflective of the diverse communities to be served by the Project.
Job start	<p>An individual employed for 16 hours a week or more beginning a position of employment with a minimum duration of 26 weeks to include one / both of the following:</p> <ul style="list-style-type: none"> • a sustainable job start for an individual from the Local Community that is workless/unemployed/out of education or training; <p>(a) a sustainable job start for an individual who has been long-term workless/ unemployed/ out of education or training for 6 months plus</p>
Legal Requirement	<p>(a) any enactment to the extent that it applies to Network Rail or the <i>Employer</i> including expressly the Crossrail Act 2008;</p> <p>(b) any regulation made by the Council or the Commission of the European Union to the extent that it applies to Network Rail or the Employer or a decision taken by the Commission which is binding on Network Rail or the Employer to the extent that it is so binding; and</p> <p>any interpretation of law, or finding, contained in any judgement given by a court or tribunal of competent jurisdiction in respect of which the period for making an appeal has expired which requires any legal requirement falling within paragraphs (a) or (b) above to have effect in a way which is different to that in which it previously had effect.</p>
Local Highway Authority (LHA)	The relevant highways authority for the highway, road or bridge as identified in Part I of the Highways Act 1980.
Local Community	Local community meaning within the vicinity of the boundaries of the Greater London Authority and the thirty-three London Boroughs or within one mile of the Crossrail route.

London Survey Grid	Crossrail Standard CR-STD-010 – London Survey Grid
LONO	LU Letter Of No Objection
LUCT	London Underground Crossrail Team
LU Interface Works	Those parts of the <i>works</i> that are on or impact on or are in the vicinity of LUL Property or systems forming part of or interfacing with the Underground Network including without limitation protective works required as a result of the Project
LUL Contractor	Any person under contract from time to time to supply works and/or services to LUL.
LUL Development Agreement	The agreement by which the <i>Employer</i> and LUL have agreed to work together to balance their respective commitments for the <i>Employer</i> to complete the Crossrail budget to time and budget and for LUL to achieve the works contemplated under its PPP Agreements (and any successors to them), its PFI contracts and its other capital projects and to operate its railway undertaking for the benefit of the travelling public.
LUL's Engineer	The engineer appointed by LUL from time to time whose appointment has been notified to the <i>Contractor</i> .
LUL Procedures	The latest revisions of documents listed in the Crossrail Standards Baseline specifying how a process or part of a process is to be performed and providing an audit trail by which the accomplishment of the tasks to be performed may be confirmed.
LUL Closures and Possession or Possession	Any disruption or restriction placed on the use or operation of the Underground Network which is necessary to Provide the Works. LUL Closures and Possessions include occupation of LUL's property, the implementation of temporary speed restrictions, diversion or blockage of the railway, single line working and interruption to or isolation of any LUL's apparatus (including for example signalling, and traction power and telecommunications systems) and similar restrictions on the use of the Underground Network by its passengers (including for example, stations, escalators and platforms).

LUL Optional Clauses	The LUL Optional Clauses included in the <i>conditions of contract</i> .
LUL Property	All land, buildings and structures (and contents thereof) owned by or leased or licensed to LUL (including the Underground Network).
LUL Requirements	Those requirements stated in Clause 11.6 of this part of the Works Information which may be applicable to any Works Package.
LUL Standards	The rules and regulations including codes of practice and standards relating to the operation of LUL's railway and/or the requirements for undertaking works on or in the vicinity of LUL station and railway infrastructure (including any or all of LUL Category 1 and 2 Standards as may be adjusted in accordance with "Standards Change Control Mechanism for Category 1 Standards 1-627" (in the case of Category 1 Standards) and "Standards Change Mechanism for Category 2 Standards 1-626" (in the case of Category 2 Standards) and issued to CRL).
LUL's Surveyor	The surveyor appointed by LUL from time to time whose appointment has been notified to the <i>Contractor</i> .
Main Road Network (MRN)	The combination of the Trunk Road Network, the Principal Road Network and the Designated Road network outside London
Management of Health and Safety at Work Regulations	[to be defined - Part 19 – Health and Safety]
Method Statement	Documented plan for a defined work activity or group of activities produced by a competent person from the <i>Contractor</i> who will perform the work; identifies applicable drawings, access, methodology, personnel, Equipment, Plant and Materials, tools, and how the work will be controlled; assesses the risks associated with the work being performed or from the use of materials together with specific mitigations to manage those risks, and establishes emergency plans
Necessary	All agreements, permissions, consents, licences, certificates, registrations

Consents	and authorisations (whether statutory or otherwise) which are required from time to time for the purposes of carrying out the Relevant Works whether required in order to comply with any Legal Requirement or as a result of any rights of any third party, including the Network Rail Consents, consents in respect of any Regulated Change and any consents required from any third party to enter and remain upon that third party's land.
Network	The railway network of which Network Rail is the facility owner (as defined in the Railways Act 1993).
Network Change	Has the meaning given to that expression in the Network Code;
Network Code	The document now known as the Network Code and formerly known as the Railtrack Track Access Conditions 1995.
Network Licence	Means the licence to operate the Network granted to Network Rail pursuant to section 8 of the Railways Act 1993.
Network Operation Issue	<p>(a) any Safety Critical Event;</p> <p>(b) any Operational Emergency;</p> <p>(c) any Legal Requirement;</p> <p>(d) any Direction of a Competent Authority;</p> <p>(e) any requirement of the Network Licence; or</p> <p>(f) in respect of Network Rail Property Works, any requirement to utilise the original copy held by the <i>Contractor</i> of any relevant agreed engineering record, drawing or any other document in respect of the Network, which is immediately necessary to address an issue arising under any of paragraphs (a) to (e) above,</p> <p>provided that in each case:</p> <p>i) Network Rail acts reasonably (but in its sole discretion in respect of its statutory obligations or safety issues); and</p> <p>ii) such issue affects or is affected by the Relevant Works;</p>

Network Rail Consents	Those consents to be given by Network Rail as set out in Appendix 10A of the Works Information.
Network Rail Property	<ul style="list-style-type: none"> (a) the Network; (b) stations (as defined in the Railways Act 1993) owned by Network Rail; and <ul style="list-style-type: none"> o any land in which Network Rail has real property interest, right or entitlement to use or occupy.
Network Rail Property Works	Those parts of the <i>works</i> which involve making permanent changes to Network Rail's Property as more fully described in the Works Information applicable to any Relevant Works Package.
Network Rail Requirements	Those requirements stated in the Works Information which may be applicable to any Relevant Works Package.
Network Rail Standard	A standards document (or the equivalent of such document) issued by Network Rail for its own use as amended by Network Rail from time to time in relation to the Network as a whole which applies to the Network Rail Property Works.
NoBo	a Notified Body appointed by the <i>Employer</i> under The Railways (Interoperability) Regulations 2011.
Non-conformity	Anything the <i>Contractor</i> does or installs that is not in accordance with the Contract or the Works Information. (The term non-conformity is used to be consistent with the industry practice and includes failure to comply with quality management documents such as procedures for managing the <i>works</i> described in the Works Information.)
Non Conformance Report(NCR)	A record of non-conformance.

NR	Network Rail
NR Possession	Planned safety arrangements which control or prevent the normal movement of rail traffic on the Network between defined locations and for a pre-defined period (including any Temporary Speed Restrictions or Isolations).
NR Possession Plan	A plan, if any, included in Volume 2A of the Works Information showing the NR Possessions that the <i>Employer</i> and <i>Contractor</i> agree are required to Provide the Works unless later changed in accordance with this contract.
NR Railway	Network Rail Property and Network Rail's operations in respect of Network Rail Property.
NR Railway Infrastructure	Network Rail's infrastructure and operational track.
NRSWA	New Roads & Street Works Act 1991
Occupational Health Programme	[Part 19 – Health and Safety]
Occupational Health Standards	[Part 19 – Health and Safety]
OHLE Contractor	Overhead Line Electrification Contractor
Olympics Mitigation Measures	Mitigation measures in connection with the Olympic and Paralympic Games to be held in London in 2012 agreed between DLR and the <i>Employer</i> .
Olympic Route Network (ORN)	The strategic routes as defined by the London Organising Committee of the Olympic and Paralympic Games and TfL.
Operating Rulebook	the rulebook developed by the operator applicable from the start of Trial Running (phase 5).

Operational Assurance Notification	[LU Interface – Part 11, pg 19]
Operational Emergency	Any unforeseen situation or circumstance which Network Rail reasonably considers requires immediate or urgent action in order to maintain or restore the effective operation of the Network or any part of it.
ORR	The Office of Rail Regulation established pursuant to section 15(1) of the Railways and Transport Safety Act 2003.
Outstanding Works List	A document to record work that has not been completed at an inspection or acceptance stage. (Appendix 20A).
Package Breakdown Structure	[Part 20 – Quality Management]
Paralympic Route Network (PRN)	The strategic routes as defined by the London Organising Committee of the Olympic and Paralympic Games and TfL
Partial Acceptance Certificate	Is a certificate issued by the Contractor when a sub-system is completely tested.
PBA	Project Bank Account
PCC	Pre-Commissioning Certificate
PDA	Project Development Agreement
PEP	Project Execution Plan. This document describes how the <i>Contractor</i> plans to Provide the Works.
Period	means each or any of the <i>Employer's</i> thirteen accounting periods in each year commencing 1 April.

Permit to Dig	[Utilities – Part 5]
Permit to Use	[Part 13 – Assurance, Records]
PFI	Private Finance Initiative
PIR	passive infrared
Placement position	A position intended to enable an individual to learn, develop or enhance their knowledge and skills in relation to the employment market that lasts between 11 days and 100 days and which includes elements of job coaching and support.
Planned Public Event	Any planned public event which is likely to generate exceptional flows of traffic on the Railway including, not necessarily limited to the London Marathon, the London Red Bull Air Race or exhibitions at Excel.
Portals	[Part 28 – Testing and Commissioning]
Possession	Any planned or scheduled temporary possession of a specified part of DLR operational property granted by DLR to the <i>Contractor</i> or other third party to facilitate work on the Railway which prevents, impairs or otherwise affects the ability of Railway to operate a service.
Possession Application Procedure	The procedure set out in section 20.1 of DLR's Working on the Railway Manual for requesting Possessions on the Railway.
Possession Schedule	The schedule of Possessions included in Volume 2A of the Works Information unless later changed in accordance with this contract.
Potential Incident Report	[Part 4 – Undertakings and Assurances]

Primavera	Primavera Project Management (P6) version 6.2.1 or later versions
Principal Road Network	Non-trunk road, classified as such by the Secretary of State as being sufficiently important in the national highway system to justify principal status
Programme Activity Codes	[Part 14 – Management]
PPP	Public Private Partnership
PPP Agreement	A public-private partnership agreement as described in section 210 of the Greater London Authority Act 1999.
Pre-Commissioning Certificate	Is a certificate issued by the Contractor when a Commissioning Lot is completely tested.
Pre-Task Health and Safety Briefing	[Part 19 – Health and Safety]
PRM	Persons of Reduced Mobility
Priority Equality Groups	women; black and minority ethnic people; disabled people; lesbians, gay men, bisexual and transgender people; faith groups; older people, children and young people, and those on low income
Protective Measures	Measures required in order to protect against any material damage to the Railway or any other interference which may affect the safe operation of the Railway or the economic and efficient operation of the Railway.
Protective Measures Assurance Statement	Statements prepared by the <i>Contractor</i> in order to obtain DLR's approval of all measures to be taken to assure that Railway assets are protected against any material damage or any other interference during the construction of the Interface Works.
PTR	Project Technical Requests. The <i>Employer's</i> standard software for routing

	and resolving Requests for Information (RFI), Field Change Documents (FCD) and Non Conformance Reports (NCR).
Punchworks	Snagging system used for the close out of defects and outstanding works up to Completion.
Quality Management System	The management system for achieving the quality requirements described in the Works Information and for demonstrating to the <i>Project Manager</i> such achievement, including the provision of documentary evidence and supporting records.
Quality Record	A record established to provide evidence of conformity with specified requirements
Quality System Procedures (QSPs)	Documents that specify operational techniques or activities that are used to fulfil requirements for quality, and as such support the Contract Quality Plan.
QUENSH Conditions	The latest revisions of mandatory procedures listed in the Crossrail Standards Baseline covering LUL's Quality, Environmental, Safety and Health Conditions which are to be complied with by the <i>Contractor</i> when undertaking their duties on LUL premises and the Underground Network.
Regulated Change	Any Network Change and/or Station Change and/or Depot Change, to the extent each is required in connection with the Relevant Works.
Regulatory Reform Fire Safety Order	[Part 19 – Health and safety]
Relevant Works	Any parts of the <i>works</i> which Network Rail determines might reasonably affect the safety and operation of the Railway, including any Network Rail Property Works which Network Rail determines is suitable to be provided under the Framework APA.
Relevant Works Package	A discrete part of the <i>works</i> which Network Rail determines might reasonably affect the safety and operation of the Railway, including any Network Rail Property Works which Network Rail determines is suitable to be provided under the Framework APA.

Relevant Works Package Schedule	A schedule, as revised from time to time, identifying the dates by which the key information required to support applications for Network Rail Consents and NR Possessions will be made.
Resource Codes	[Part 14 – Management]
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.
RIR	Register and Issue Record
RIVO	electronic Incident Management System. Full title IMS-RIVO Safeguard.
RSPB	Royal Society for the Protection of Birds
Safe Management Plan	The document prescribed in Appendix 10B of the Works Information which demonstrates how the <i>Contractor's</i> management structures and controls are capable of understanding Railway related risks including in the design and construction of the Relevant Works Packages.
Safe Methods of Working	Method statements prepared by the <i>Contractor</i> for inclusion with the Execution Plan Submission.
Safety Alert	[Part 19 – Health and Safety]
Safety Critical Event	An event or incident resulting in likely risk to the health and safety of any individual or risk of damage or destruction to any property, or any incident which may reduce the safety integrity levels of any item of the Network.
Security Zone 1	Within the Site comprises exclusion areas which may include restricted underground working areas, railway operational areas and facilities and defined storage areas for valuable and dangerous Plant and Materials and Equipment.
Security Zone 2	Within the Site comprises construction activity, storage and fabrication areas other than Zone 1 area.

Security Zone 3	Within the Site comprises administration areas (offices, parking areas etc. where no construction work is to be executed).
Service(s)	Electricity cables, gas pipes, water pipes (including piped sewage), other pipelines or signalling and telecommunication cables and equipment irrespective of owner. See also Utility.
SDCC	Staged Design Compliance Certificate which is issued by the designer to certify that his design is compliant with the <i>Employer's</i> requirements, the project requirements, and the CDS and has been integrated within the applicable interface designers.
SLNT	Strategic Labour Needs and Training
Small Claims Scheme	[Part 9 – Community Relations and Publicity] <i>Employer</i> operated claims scheme for the purpose of providing for the prompt and convenient resolution of minor claims for physical damage to property up to a maximum value of £5,000 for any one occurrence, arising from the construction of the <i>works</i> .
Snagging List	A document to record work that has not been completed satisfactorily at an inspection or acceptance stage (Appendix 20A).
Standards	Group Standards, Network Rail Standards, Crossrail Standards Baseline and any equivalent standards or any standards replacing or superseding any of them.
Static Integration Tests	are Static Tests of the integrated Elementary Systems undertaken during Phase 3 of the Testing and Commissioning process.
Static Tests	tests carried out without Test Trains, other than what would qualify as recording cars, on isolated systems.
Station Change	The procedures contained in Schedules 2 and 3 (as applicable) of the Station Access Conditions;

Station Access Conditions	The National Station Access Conditions 1996 (England and Wales) together with the station specific annexes applicable to the relevant stations the subject of the Relevant Works or any replacement of the same;
Sub-systems	parts of the Elementary Systems that can be tested as sets of components or assemblies and which can be possibly tested together without interfering with other parts.
Summary Schedule	the basis for developing and reporting contract schedules to management and key stakeholders from initiation through all project completion phases.
Taking Into Use	The act of taking into use of the Network Rail Property Works or part thereof, and the taking out of use of other assets by Network Rail on the basis that Network Rail is satisfied that the assets in question have been inspected, tested and commissioned, as applicable, in accordance with the relevant requirements of the Works Information and the special requirements set out in Appendix 10E and "Take Into Use" and "Taken Into Use" shall be construed accordingly.
Target Zero	The <i>Employer's</i> health and safety programme and health and safety philosophy
TBM	Tunnel Boring Machine
TCC	Traffic Coordination Centre
Temporary Speed Restriction	A planned restriction on the speed of rail traffic between defined locations for a specific period of time.
Temporary Works	<p>Temporary Works - Those parts of the <i>works</i> that allow or enable construction of, protect, support or provide access to, the permanent parts of the <i>works</i> and which might or might not remain in place at Completion</p> <p>Temporary Works include but not limited to</p> <ol style="list-style-type: none"> (1) all support measures and works, ground treatment, groundwater control and support and stabilisation to uphold the excavated surfaces and excavations of tunnels, portals, shafts, trenches, retaining structures and the like; (2) protection to third party assets during the provision of the <i>works</i> ; (3) all temporary works required to provide temporary access to the Site; (4) any other temporary works or sequencing that are required to provide the <i>works</i> including but not limited to the temporary works items listed in Volume

	2A of the Works Information, (5) Equipment i.e. items provided by the <i>Contractor</i> and used by him to Provide the Works and which the Works Information does not require him to include in the <i>works</i>
	.
PTest Panels	[Part 20 – Quality Management]
Test Train	a new rolling stock train set or a specialised recording car or any other piece of rolling stock hauled by any type of locomotive.
TfL ST	Transport for London's Surface Transport
The Mayor of London's Green Procurement Code	[Part 21 – Environmental Management]
TLRN	Transport for London Road Network
Traffic	unless otherwise defined means vehicles, cyclists and pedestrians
Traffic Authority	The local Traffic Authority has the meaning given by section 121A of the Road Traffic Regulation Act 1984.
Traffic Management Equipment	All signs and their covers, cones, cylinders, studs, barriers, road markings, lights and traffic signals including their supports and fixings and any cabling, piping, joints, connectors, electricity supply, weighting down and any other item required for a Traffic Management System.
Traffic Management Operation (TMO)	Those activities necessary to assemble, maintain, alter or remove a Traffic Management System.
Traffic Management	The method chosen to direct traffic through or around the Site and the Working Areas to facilitate the <i>works</i> .

System (TMS)	
Traffic Regulation Order (TRO)	An order of the relevant road traffic authority under the Road Traffic Regulation Act 1984.
Trainee	An individual on a placement position or work experience
Transfer Site	The Dockland's transfer site. (DTS)
Train Operating Company (TOC)	A company whose business includes the transportation of passengers by rail and with whom Network Rail have an agreement specifying minimum rights of access to the Network.
Trial Running	the integrated testing of each Elementary System, including those delivered by the <i>Contractor</i> to demonstrate that the Elementary System (in conjunction with the other Elementary Systems) is capable of reliably meeting the capacity and other requirements of the <i>Employer's</i> and the Sponsors' Requirements.
Trial Operations	the undertaking by the operators of tests and trials to prepare for and demonstrate that they are capable of operating the Railway in accordance with the Sponsors' Requirements and the Operators' Safety Management Systems.
Trunk Road Network	Highways constituting part of the national system of routes for through traffic and for which the Secretary of State is the highway authority
Underground Network or Network	The stations, depots, assets, systems, track and buildings and structures of whatsoever kind which are used in the operation, maintenance and provision of the service known as the "London Underground".
Undertakings and Assurances	[Utilities – Part 5] Commitments, and promises made by the <i>Employer</i> to third parties in regard to the execution of the Project
Utility Works	The diversion, relocation, and/or protection of above or below ground utility apparatus located in the public highway or private land. A utility is a business that provides necessities such as water, gas, electricity, telephone, fibre optic

	cable and traffic management devices such as traffic lights and automated pedestrian crossings.
Variation	Any change or variation to the scope or methodology of a Relevant Works Package.
VMPS	Vehicle Movement Planning System
VOSA	Vehicle and Operator Services Agency
Weekend Possession	Any Possession granted between 01:30 hours on any Saturday and 04:30 hours on the next following Monday.
Work Authorisation Document (WAD)	Is the document to be produced by the <i>Contractor</i> in accordance with the WAD process to ensure that there is controlled access to areas of live, or potentially live Plant and Materials, or systems which may be under test or activated from remote locations.
Work Experience	A position is intended to introduce an individual to a specific industry, occupation or position and may have a duration between 1 day and 10 days of structured activity.
Workforce Skills	Workforce training or development activity for full time employed individuals of an accredited course of learning and development and/or nationally recognised qualification or industry recognised programme measured in complete days (based on 7 hours a day).
Working Hours and Shift Pattern Assessment	[Part 19 – Health and Safety]
Working on the Railway Manual	Part of the DLR Standards and Procedures having document number SOP PC 1.01.
Work Site(s)	For the purposes of Part 11 of this Works Information, the location(s) in which the LU Interface Works will be carried out.

Worksite	For the purposes of Part 10 of this Works Information, any lands and other places, on, under, in or through which the Relevant Works Package is to be executed. [Network Rail]
Works Documents	The design data and drawings, calculations, soil and material testing information, specifications, working methods, programmes, method statements, plans, drawings and specifications, risk assessments, Construction Phase Plan (pursuant to the CDM Regulations), and any other information reasonably required in relation to the LU Interface Works.
Works Commencement Date	<p>The Works Commencement Date in respect of any Relevant Works Package is the latest of:</p> <ul style="list-style-type: none"> the date upon which all Necessary Consents (which must include detailed design approval) have been obtained or agreed by Network Rail which are necessary to commence the carrying out of the Relevant Works Package; the date of completion of the relevant preliminary works required to be carried out by the <i>Contractor</i> in accordance with this part of the Works Information; and the date of agreement of the Safe Management Plan.
Works Package	A discrete package of LU Interface Works
Works Package Plan (WPP) Submission	A technical submission in relation to a Works Package which defines the scope and forms part of the preliminary discussion with LUL giving an outline of the proposed LU Interface Works intended to satisfy them that the Employer's proposals for the LU Interface Works do not prejudice the safe operation of the Underground Network.
Works Requirements	The relevant requirements set out in the Works Information.
Zone	A security zone

Systemwide Additional Glossary

ALARP	As Low as Reasonably Practicable
AsBo	Independent Assessment Body
Availability	<p>is the ability of a product to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval assuming that the required external resources are provided (Ref BS EN 50126).</p> <p>Complementary definitions :</p> <ul style="list-style-type: none"> - Instantaneous Availability $A(t)$ is the probability that system didn't fail on time interval $(0,t)$ or functioned correctly since repair happened on $(0,t)$ - Mean Availability is the mean value of $A(t)$ on a time period T - Steady-State Availability A_{∞} is the limit of the instantaneous availability function $A(t)$ as time approaches infinity - Inherent Availability is A_{∞} with corrective maintenance only - Intrinsic Availability is inherent Availability with Active Repair Time only - Operational Availability is a measure of the Mean Availability over a period of time or mission/service profile. It includes all experienced sources of downtime, such as preventative maintenance downtime, administrative downtime, logistic downtime, etc.
BS	British Standards
CCRRB	The Construction and Commissioning Railway Rule Book prepared by the <i>Employer's</i> C610 Systemwide Main Works Contractor
CDM	Construction Design & Management Regulations

Common Cause Failures	<p>A common cause failure is one in which a single failure or condition affects the operation of multiple devices that would otherwise be considered independent.</p> <p>Common cause failures can for example have environmental causes (e.g. lightning, fire), result from faulty design or manufacturing (e.g. incorrect calibration) or simultaneous maintenance errors (e.g. wrong procedure applied to identical redundant elements).</p>
CSM	Common Safety Method Regulation
DeBo	Designate Body
DESEJ	Design Engineering Safety Justification – preliminary safety document to confirm the <i>Contractor's</i> design is fit for purpose prior to installation, testing and commissioning.
DOORS	Database Object-Oriented Requirements System
DRACAS	Data Recording and Corrective Action System (DRACAS), identifies the procedures and methods for formally recording and classifying all defects that occur during the testing phases and trial running reliability demonstration phase. The DRACAS also identifies the procedure for recording all corrective actions associated with a defect, thus providing a traceable and auditable trail for any subsequent investigation into the design and manufacture of assets. Also known as FRACAS (Ref BS EN 50126).
Elements	are the various components that together constitute an Elementary System: Sub-systems, plant, Line Replaceable Units (LRU)
Electromagnetic Environment	<p>The electromagnetic environment which may have an impact on or be impacted by the <i>works</i> includes but is not limited to:</p> <ul style="list-style-type: none"> • emissions from the a.c. traction system for the rolling stock; • high and low voltage power distribution equipment; • TV and radio broadcasting equipment; • telecommunication equipment including mobile telephones;

	<ul style="list-style-type: none"> • sensitive installations; • domestic or publicly carried electrical equipment. <p>The electromagnetic environment shall neither interfere with nor be interfered with by the <i>works</i></p>
EMC/EMI	Electromagnetic Compatibility/ Electromagnetic Interference
EN	Euro Norm
ESJ	Engineering safety Justification – final safety document prepared at successful completion of testing and commissioning such that the Elementary System can be safely brought into service.
ESM	Engineering Safety Management
ETA	Event Tree Analysis
Factory Acceptance Certificate	Is issued by the <i>Contractor</i> when Plant and Materials are completely tested in factory before shipment to the Site
Failure Rate	The limit, if it exists, of the ratio of the conditional probability that the instant of time, T , of a failure of a product falls within a given time interval $(t, t+dt)$ and the length of this interval dt , when dt tends towards zero, given that the item is in an up state at the start of the time interval (Ref BS EN 50126). Often written $\lambda(t)$.
FMECA	<p>Failure Modes, Effects and Criticality Analysis</p> <p>An assessment of potential failures and their effect on train delays/stations Availability and Safety.</p>
FTA	Fault Tree Analysis
HAZID	Hazard Identification

HAZOP	Hazard and Operability Study
IDT	Incident Detection Time states for time from the instant when failure occurs until it is effectively reported to maintainers as an incident.
IHA	Interface Hazard Analysis
IRT	Incident Response Time is composed of logistic preparation time for the intervention on a failure and access time from maintenance depot to faulty asset's location.
ISA	Independent Safety Assessor
ISwA	Independent Software Assessor
LRU	Line Replaceable Unit is an essential element that can be replaced by operator or at first level of maintenance to restore the end element to an operational condition after a failure (or also as a preventive action).
LUL	London Underground Limited
Maintainability	<p>Maintainability is considered on both quantitative and qualitative aspects :</p> <p>Quantitative Maintainability is defined as the probability that a given active maintenance action, for an item under given conditions of use, can be carried out within a stated time interval when the maintenance is performed under stated conditions and using stated procedures and resources (Ref BS EN 50126).</p> <p>Qualitative Maintainability states for characteristics of design and installation which are likely to ease maintenance and increase quantitative maintainability.</p>
MART	Mean Active Repair Time is the time to repair the asset once the maintainer is on site including failure diagnosis, removing covers, repair of asset, replacing covers and restarting the asset back into service.
MTTF	MTTF is a basic measure of reliability for non-repairable products. It is the mean time expected until the first failure of a product. Is equal to the inverse of the Failure Rate (λ) when using a constant rate.

MTBF	Mean Time Between Failures of an element while considering one or several failure modes or consequences. Is the sum of MTTF and MTTR for repairable systems having constant failure and repair rates.
MTBSAF	Mean Time Between Service Affecting Failures: is an MTBF for failures likely to impair train or stations service performance (or affecting main functions when mentioned for a single item).
MTTR	Basic measure of the maintainability of repairable items. It represents the 'Mean Time To Repair' which includes the time for detection, preparation, access and active repair of a failed element (corrective maintenance). Hence the relation : $MTTR = \text{mean IDT} + \text{mean IRT} + \text{MART}$
NNTRs	Notified National Technical Rules
NoBo	Notified Body
NR(IL)	Network Rail (Infrastructure Limited)
ORR	Office of Rail Regulator
PADS	Parts and Drawings System (NR)
PBS	Product Breakdown Structure as defined in Part 29 – document to confirm the existing railway proven use of Plan and Equipment in the Design of Elementary Systems before their procurement.
PSC	Product Safety Case as defined in Part 32 – document prepared for the pre-approval of new/novel or bespoke Plant or Equipment before their procurement.
PWHR	Project Wide Hazard Record (i.e. hazard log) as defined in Part 32.
RAM(S)	Reliability, Availability & Maintainability (and Safety)
RBD	Reliability Block Diagram

RCI	<p>Reliability Critical Items are items that represent elements of risk in meeting the RAM requirements</p> <p>RCIs are items with relatively high failure rates, possible obsolescence, short life expectancies, are difficult to maintain or have novel features, any of which has the potential to reduce systems availability.</p>
Reliability	The probability that an item can perform a required function under given conditions for a given time interval (t1, t2) (Ref BS EN 50126).
Repair Rate	The limit, if it exists, of the ratio of the conditional probability that the instant of time, T, of a failure of a product is repaired falls within a given time interval (t, t+dt) and the length of this interval dt, when dt tends towards zero, given that the item is in a down state at the start of the time interval. Often written $\mu(t)$.
RIR 2011 R(I)R	Railway (Interoperability) Regulations 2011
RMC	Rail Movement Controller, person appointed by the Employer's C610 Systemwide Main Works Contractor to manage movements of works trains and associated work sites along the railway or trace.
ROGS	Railways and Other Guided Transport Systems (Safety) Regulations 2006
SIL	<p>Safety Integrity Level (from lowest 1 to highest 4).</p> <p>Target Failures for Safety functions allocated to safety related systems (Ref 2 - BS EN 61508)</p>
SSP	System Safety Plan as defined in Part 29 – document to establish the Contractor's ESM approach, agree list of contract safety deliverables and programme for their delivery.

SSRS	System Safety Requirements Specification as defined in Part 29
SSSP	System Software Safety Plan as defined in Part 29 – document to confirm the <i>Contractor's</i> software development strategy consistent with BS EN 50128.
Stage Gate ESM Report	Stage Gate ESM report – to confirm a suitable and sufficient depth of engineering safety Management to pass design stage gates (e.g. 30%, 605, 90% Completion).
System SIL Requirements Report	System Safety Integrity Requirements Report as defined in Part 32 – document to determine and agree the requirements for SILs assigned to the functionality of the Elemental Systems
TSI	Technical Specification for Interoperability as defined in the RIR
WAD Coordinator	<p>the person appointed by the Principal Contractor to manage the WAD Process. The WAD Coordinator is in charge of communicating the change of status for a Commissioning Lot at IRN stage, of maintaining the WAD register (refer to Appendix A of the Work</p> <p>Authorisation Document procedure Doc No: CRL1-PDP-O8-GDP-CRG03-00004]), gathering the WAD requests and editing a weekly a WAD form on behalf of the Principal Contractor.</p>

Version Control

Version	Change Summary
1.0	Updated for Project Simplify and incorporated into a single document replacing the sections shown in Table 1 below.
1.1	Human factors and minor formatting corrections added to Part 29
1.2	Minor amendments to Part 29 for Cad Data
1.3	Part 27 added and Integration Manager added

Learning Legacy Document

Table 1 – Versions replaced by Project Simplify

Part 1 - Project Description (Rev 4.0)
Part 2 - Provision Content and Use (Rev 5.0)
Part 3 - Planning Environmental Traffic Consents (Rev 8 0)
Part 4 - Undertakings & Assurances (Rev 8.0)
Part 5 - Utilities (Rev 6.0)
Part 6 - Setting Out (Rev 4.0)
Part 7 - Contractor's Design - Permanent Works (Rev 6.0)
Part 9 - Community Relations & Publicity (Rev 6.0)
Part 10 - Network Rail Interface (Rev 5.0)
Part 11 - LU Interface (Rev 6.0)
Part 12 - Docklands Light Railway Interface (Rev 5.0)
Part 13 - Assurance Records Certification (Rev 10 0)
Part 14 - Management and Administration (Rev 6.0)
Part 15 - Responsible Procurement (Rev 7.0)
Part 16 - Security (Rev 6.0)
Part 17 - Facilities and Services (Rev 6 0)
Part 18 - Traffic Management (Rev 6.0)
Part 19 - Health & Safety Management (Rev 8 0)
Part 20 - Quality Management (Rev 5.0)
Part 21 - Environmental Management (Rev 7 0)
Part 22 - Equipment & Temporary Works - Design & Implementation (Rev 6 0)
Part 23 - Labour Relations (Rev 5.0)
Part 24 - Inclusivity (Rev 4.0)
Part 26 - Logistics Management (Rev 5.0)
Part 28 - Testing and Commissioning Process (Rev 1.0)