



Crossrail

**Programme Partner
Project Delivery Partner
OJEU Notice 2008/S 65-088136
Invitation to Tender
Briefing Material**



CROSS LONDON RAIL LINKS

PROGRAMME PARTNER AND PROJECT DELIVERY PARTNER Contract No. C2072 Lots 1&2

Briefing Material

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1.0 Glossary

In this briefing material, the following defined terms have the following meanings.

Defined term	Meaning
Anticipated Final Cost	As defined in the PDA.
BMS	CLRL's Business Management System.
CAG	The CLRL Compliance and Assurance Group as defined in the PDA.
Central Section or Project	The "Central Section" as defined in the PDA.
CLRL	Cross London Rail Links Limited of Portland House, Bressenden Place, London SW1E 5BH.
Collaboration Agreement	"Oversite Development Collaboration Agreement" as defined in the PDA.
Construction Code	The Construction Code at Annex 1 to the EMR.
CPFR	Crossrail Project Functional Requirements.
Crossrail Act or Act	The Crossrail Act 2008
Crossrail Programme or Programme	The "Project" as defined in the PDA.
CWG	Means Canary Wharf Group plc
Delivery Contracts	As defined in the PDA.
Delivery Partners	The Programme Partner and the Project Delivery Partner.
Delivery Strategy	The Crossrail Programme Delivery Strategy dated 22 July 2008.
Design Framework Consultants	The design consultants to be appointed by CLRL under framework agreements relating to the detailed design of the Crossrail Programme pursuant to OJEU Notice 2008/S 65-088136.
Development Manager	The development manager currently appointed by CLRL.

DfT	The Department for Transport.
DLR	Docklands Light Railway Limited.
Environmental Minimum Requirements or EMR	The Crossrail Environmental Minimum Requirements (final version, revision 5.0 dated 22/07/08).
Excom	CLRL's Executive Committee
EWMA	The Enabling Works Managing Agent currently appointed by CLRL.
GLA	The Greater London Authority.
Heads of Terms or HoT	The heads of terms between DfT and TfL http://www.dft.gov.uk/pgr/rail/pi/crossrail/crossrailheadsofterms/ .
Industry Partner Agreement	As defined in the PDA.
Industry Partners	As defined in the PDA.
Intervention Point	As defined in the PDA.
LUL or LU	London Underground Limited.
MDCs	The multi-disciplinary consultants currently appointed by CLRL.
Nominated Undertaker	As provided under section 39 of the Crossrail Act and The Crossrail (Nomination) Order 2008.
On Network Works	As defined in the PDA.
Operator	As defined in the PDA.
OSD	Means "Oversite Development" or "Oversite Developer" as defined in the PDA.
NR	Network Rail.
Programme Partner	The Programme partner to be appointed by CLRL pursuant to OJEU Notice 2008/S 65-088136 in relation to the Crossrail Programme.
project	Any project forming part of the Crossrail Programme.
Project Delivery Partner	The Project delivery partner to be appointed by CLRL pursuant to OJEU Notice 2008/S 65-088136 in relation to the Central Section.

Project Delivery Programme	As defined in the PDA.
Project Development Agreement / PDA	The agreement to be entered into between CLRL and the Sponsors appointing CLRL to deliver and implement the Crossrail Project.
Project Milestones	As defined in the PDA.
Regulatory Protocol	The “Network Rail Regulatory Protocol” as defined in the PDA.
Review Point	As defined in the PDA.
RfL	Rail for London.
SoS	The Secretary of State for Transport.
Sponsor Committed Funding	As defined in the PDA.
Sponsors Agreement	As defined in the PDA.
Sponsors	TfL and DfT.
Sponsors Requirements	As defined in the PDA.
Stakeholders	The Sponsors, Industry Partners and other Programme stakeholders.
TfL	Transport for London.
TfL Shareholders Agreement	The “Shareholder Agreement” as defined in the PDA.
Undertakings and Assurances	The undertakings and assurances listed in the Register of Undertakings and Assurances.

2.0 Introduction

- 2.1. This briefing material is provided to Tenderers for the Programme Partner and Project Delivery Partner contracts and is a reflection of the status of the ongoing development of the Programme when the briefing material was prepared in July 2008. It is intended to provide Tenderers with an introduction to the Crossrail Programme and is for guidance purposes only.
- 2.2. The information set out in this briefing material is not commercially binding and subject to the provisions of the Disclaimer contained within Part 1 of the Invitation to Tender.
- 2.3. Much of the information contained within this briefing material is subject to change, particularly in the light of ongoing negotiations with third parties on agreements relating to delivery of the Crossrail Programme, including the Project Development Agreement, the Regulatory Protocol with Network Rail and agreements with London Underground, Docklands Light Railway and the Canary Wharf Group.
- 2.4. The latest position on the Crossrail Programme is set out in the material which will be contained within CLRL's data room (including the Project Development Agreement, the Regulatory Protocol, third party agreements and the Crossrail Programme Delivery Strategy).
- 2.5. The briefing material is intended to give introductory information on the:
 - Crossrail Programme;
 - Governance regime under which the Programme and its constituent projects will be delivered;
 - Key Stakeholders;
 - Technical and management background to the Programme, including CLRL's proposed Delivery Strategy and Procurement Strategy;
 - CLRL's proposed organisational structure;
 - Outline roles and responsibilities within that organisation.
- 2.6. This briefing material and the Programme documents contained within CLRL's data room are intended to give Tenderers a common level of understanding of the Crossrail Programme.
- 2.7. The briefing material does not seek to define the scope of the Programme Partner's role and the Project Delivery Partner's role. It does, however, provide Tenderers with contextual information on how the roles were seen as functioning within CLRL's proposed delivery organisation when the document was prepared.

3.0 Crossrail – Programme Description

This section provides Tenderers with an introduction to the Crossrail Programme, its objectives, the governance regime in which the programme of works will be delivered, the third party environment surrounding Crossrail and the role of CLRL and its corporate management structure.

3.1 Programme Objectives

3.1.1 Crossrail is one of the largest infrastructure construction programmes in the world and an exciting and visionary new railway proposal for London, the South East and the UK. It will make travelling in the area easier and quicker and it comprises a complex programme of interrelated works that must combine to deliver a new world class rail service across London for £15.9 billion (at prices of the day) by 2017.

3.1.2 At its peak it will be the largest engineering programme in Europe, creating thousands of jobs in construction and in the longer term through regeneration.

3.1.3 Crossrail's key objectives are to:

- Significantly increase rail network capacity into central London to relieve over-crowding and congestion on existing services, and cater for expected growth in demand for travel into the capital over the coming decades.
- Significantly increase rail network capacity across London to relieve over-crowding and congestion on the Underground, and to cater for expected growth in demand for east-west travel across the capital over the coming decades.
- Create the transport infrastructure to achieve planned growth for London and, in particular, facilitate the delivery of regeneration policy in communities such as the Docklands, Thames Gateway and Lea Valley.
- Create the transport infrastructure to facilitate the continued development of London's primary finance and business service activities, which are now located in both the City and Docklands.
- Significantly reduce cross-city journey times by creating new direct journey possibilities between points to the east and west of London and providing a high frequency, high speed service between stations.
- Support the development of an integrated transport network across London and the South East by contributing to the creation of a network of strategic interchanges between transport modes.
- Facilitate the improvement of London's international connections by creating a new direct, high capacity rail link between Heathrow and central / east London, and improving connections to Luton, Gatwick, Stansted and international rail services.
- Support the Government's and Local Governments' wider transport, planning, social and environmental objectives.
- Deliver these objectives in a manner that ensures value for money for taxpayers and other contributors.
- To deliver a world class affordable railway, that also ensures we implement the Crossrail values of zero accidents and respect for people.

- 3.1.4 The scale and complexity of Crossrail is considerable. The aim is to operate a minimum of 24 trains per hour on dedicated subterranean infrastructure through central London and interweave services with national rail services on Network Rail infrastructure south-east, north-east and west of London.
- 3.1.5 Central London stations will integrate with existing LUL stations whilst those in Docklands will offer connection to the Docklands Light Railway.
- 3.1.6 The scope of the infrastructure works can be summarized as:
- 23km of new subsurface railway infrastructure across central London;
 - 27 existing surface station upgrades, including 11 major reconstructions;
 - 14 shafts for ventilation, escape and intervention and 5 tunnel portals;
 - 8 new subsurface stations in central London;
 - Sidings and 1 depot;
 - 1 control centre;
 - Modifications to existing surface railways over a route length of 76km;
 - Provision of all necessary railway systems; and
 - A train fleet allowing 58 peak hour services.
- 3.1.7 An overview of the permanent works is given in Figure 3.1.1.
- 3.1.8 Following enactment of the Crossrail Act 2008 and the nomination of CLRL and LU as nominated undertakers for the Programme, the main construction works are expected to start in 2010 and to last for six to seven years.
- 3.1.9 The current development phase of the Programme will result in a single option design solution for most locations to a level of detail broadly synonymous with RIBA stage D (a Scheme Design) and GRIP Stage 3 plus. This work has been undertaken by CLRL and its existing supply chain partners, including its designers (the MDCs), its Development Manager and the Enabling Works Management Agent.
- 3.1.10 The Crossrail Programme will be engineered, procured and constructed as a series of projects by CLRL and its Industry Partners. Crossrail will therefore need to be managed at a number of levels - at a Programme level, at a project level and at a contract level.
- 3.1.11 The main Crossrail project to be delivered is the Central Section (referred to as the Project in the Invitation to Tender documents). This is the section of the Programme which runs through Central London and extends from Westbourne Park/Royal Oak in the west, to Pudding Mill Lane Portal in the east and Plumstead in the south east. The Central Section excludes works undertaken by third parties.
- 3.1.12 Arrangements are being made to transfer responsibility for the development and procurement of On Network Works to Network Rail and therefore the Programme Partner is not expected to be responsible for the day to day delivery of On Network Works or the third party works; there will however be programme management oversight of all Crossrail Programme elements and a significant interface to be managed.
- 3.1.13 On Network Works can broadly be defined as the works required for the surface route sections of the scheme and are shown in Figure 3.1.1. The On Network Works are those to the west of Westbourne Park/Royal Oak, to the east of Pudding Mill Lane Portal and to the east of Plumstead portal.

- 3.1.14 CLRL is in the process of reaching an agreement with London Underground for the delivery of works on or adjacent to the Underground network, but will remain responsible for their safe and timely integration with the Central Section works.
- 3.1.15 The Crossrail Programme has a number of interfaces with the Docklands Light Railway. These include facilitating new works at Custom House, Royal Victoria and Pudding Mill Lane. CLRL is in the process of reaching agreements with DLR on operational, delivery and land/property issues associated with these works.
- 3.1.16 Certain other elements of the works will be delivered by third parties, principally, works for Isle of Dogs Station, Woolwich Station Box, the CLRL depot and the rolling stock which will be procured by CLRL and leased by the future operator.

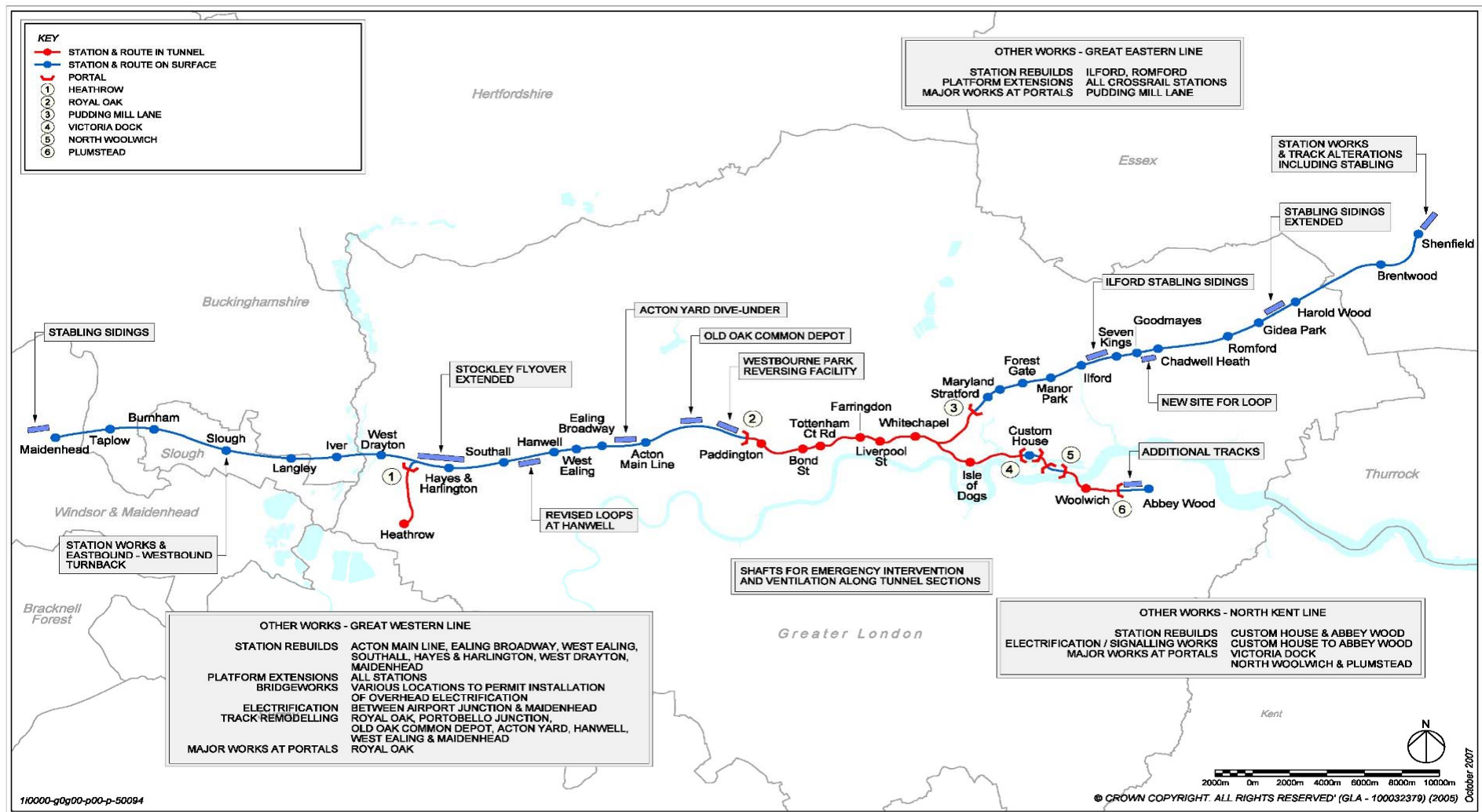
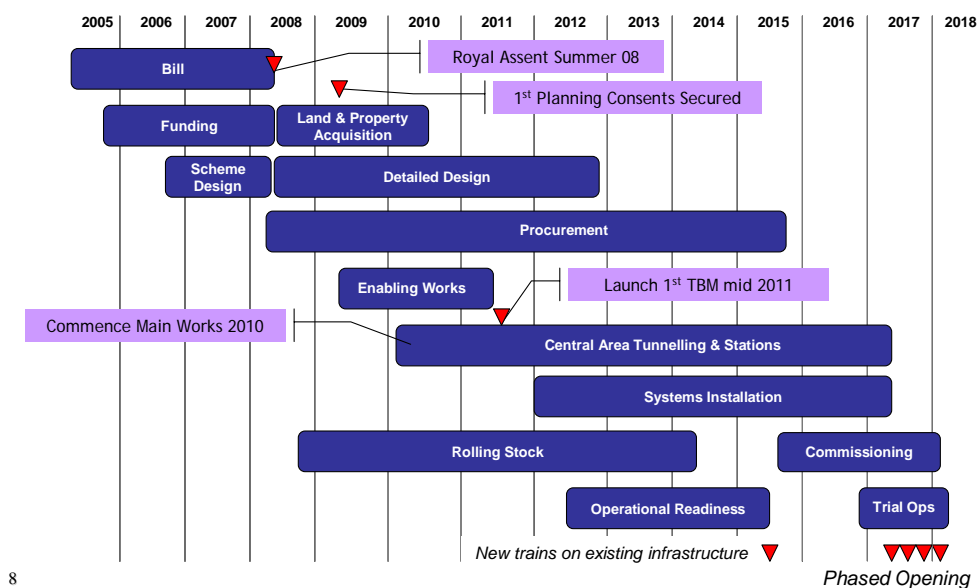


Figure 3.1.1 Overview of Permanent Works

3.2 Schedule, milestones and phasing

- 3.2.1 An indicative programme for Crossrail is illustrated in Figure 3.2.1. This incorporates industry recognised stages in the development of a capital works programme and would involve a degree of overlap of these key stages.

Indicative Crossrail Programme



8

Figure 3.2.1 Indicative Crossrail Programme

- 3.2.2 The development phase was established to allow the Programme to be progressed in parallel with seeking powers and implementation funding.
- 3.2.3 The detailed design phase will enable the Scheme Design to be developed to a level of detail to enable construction or design and build contracts to be procured.
- 3.2.4 The construction procurement strategy for Crossrail is being developed to cater for both engineer's design and design and build as appropriate to the various elements of the works
- 3.2.5 The Programme Partner's and Project Delivery Partner's appointments will encompass the management of the detailed design and implementation phases.

3.3 Governance

3.3.1 The governance arrangements for Crossrail are laid out in the Heads of Terms published by the Department for Transport. These detail the agreements between DfT and TfL that underpin the funding of Crossrail and will be superseded by the various agreements that are currently being negotiated, including the PDA. The Heads of Terms are available at:

<http://www.dft.gov.uk/pgr/rail/pi/crossrail/crossrailheadsofterms/>.

3.3.2 Delivery of the Programme is the responsibility of CLRL, which is presently owned jointly by the Sponsors: the Department for Transport (DfT) and Transport for London (TfL).

3.3.3 CLRL will become a 100% owned subsidiary of TfL (subject to certain rights retained by DfT to reflect its contribution to the Crossrail Programme) and CLRL has been appointed as a nominated undertaker under the Crossrail Act.

3.3.4 The sponsorship and delivery framework within which CLRL will operate is illustrated in Figure 3.3.1.

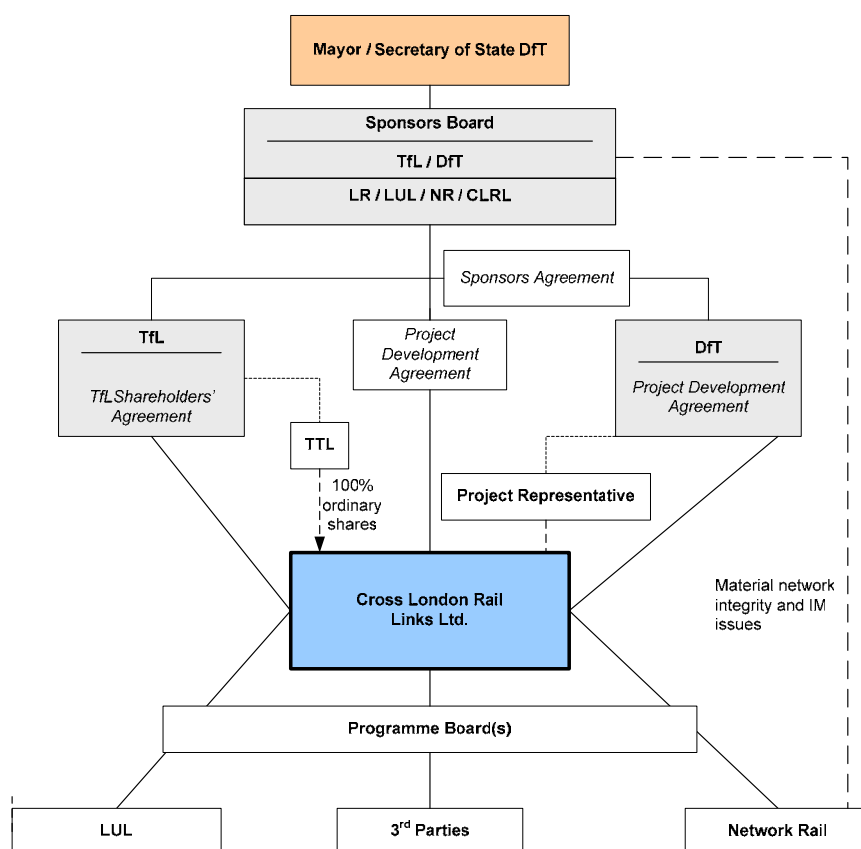


Figure 3.3.1 – Sponsorship & Delivery Framework

3.4 Stakeholders

3.4.1 The principal stakeholders and their presently envisaged Programme roles are identified in Figure 3.4.1.









Logo	Stakeholder	Programme Role
	HM Treasury (HMT)	Stakeholder and MPRG.
	Department for Transport (DfT)	Co-Sponsor. Main interface to Central Government and HM Treasury.
	Transport for London (TfL)	Co-Sponsor. Main interface to Local Government and the Mayor of London's Office. Owner of the Central Section.
	Cross London Rail Links (CLRL)	Delivery vehicle. Presently 50/50 Joint Venture between DfT and TfL. Main interface to the delivery supply chain. CLRL will become a 100% owned subsidiary of TfL.
	Network Rail (NR)	Industry Partner. Responsible for the operation, maintenance and renewal of the National Rail Network. Infrastructure Manager of the Crossrail end to end rail systems. Main interface to Train Operating Companies (TOCs) and Freight Operating Companies (FOCs).
	London Underground (LU)	Industry Partner. Responsible for the operation, maintenance and renewal of the London Underground transport system. Infrastructure Manager of the Central Section stations (except Paddington). Main interface to the PPP and PFI contractors.
	Rail for London (RfL)	Operator franchising authority for the Crossrail rail service. Infrastructure Manager of Crossrail stations at Paddington, Isle of Dogs and Woolwich.
	Docklands Light Railway (DLR)	Industry Partner. Responsible for the operation, maintenance and renewal of the Docklands Light Railway transport system and for providing CLRL with access for proposed modifications to the DLR

Figure 3.4.1 – Crossrail Stakeholders

- 3.4.2 A Regulatory Protocol will define the On-Network works to be undertaken by Network Rail and a Development Agreement those to be undertaken by London Underground for the delivery of certain works on or adjacent to the Underground network. Both documents remain the subject of negotiation. In each case CLRL will remain responsible for their safe and timely integration with the Central Section works and for delivery of the entire Programme under the PDA.
- 3.4.3 Certain other elements of the works will be delivered by third parties, principally:
- Isle of Dogs Station, delivered by Canary Wharf Group;
 - Woolwich Station Box, delivered by Berkeley Homes;
 - The CLRL depot, delivered through a design, build, finance and operate partner; and
 - Rolling stock will be procured by CLRL and leased by the future operator.
- 3.4.4 The Crossrail Programme Delivery Strategy contains a list of the agreements that are required for Crossrail (including the Sponsors' Agreement and TfL Shareholders' Agreement).
- 3.4.5 TfL will be responsible for the future operation of the railway and it is currently envisaged that RfL will appoint a train operating company (TOC) to operate the Crossrail train service and some of the stations. CLRL has established a Railway Services team who will be responsible for liaising with RfL, other operators and infrastructure managers to coordinate operational input into the Programme through the Specification Board.
- 3.4.6 CLRL's Railway Services team is staffed with experienced railway operators and safety professionals from train operating companies and infrastructure managers, who have the necessary experience to specify the requirements, develop the operating procedures and to establish a railway safety management system.

3.5 CLRL's Programme Management Organisation

3.5.1 Figure 3.5.1 indicates the strategic framework within which Crossrail will be delivered and emphasises the different levels of management and reporting that will be required at a Sponsor/Stakeholder, Programme, Central Section Project and contract level.

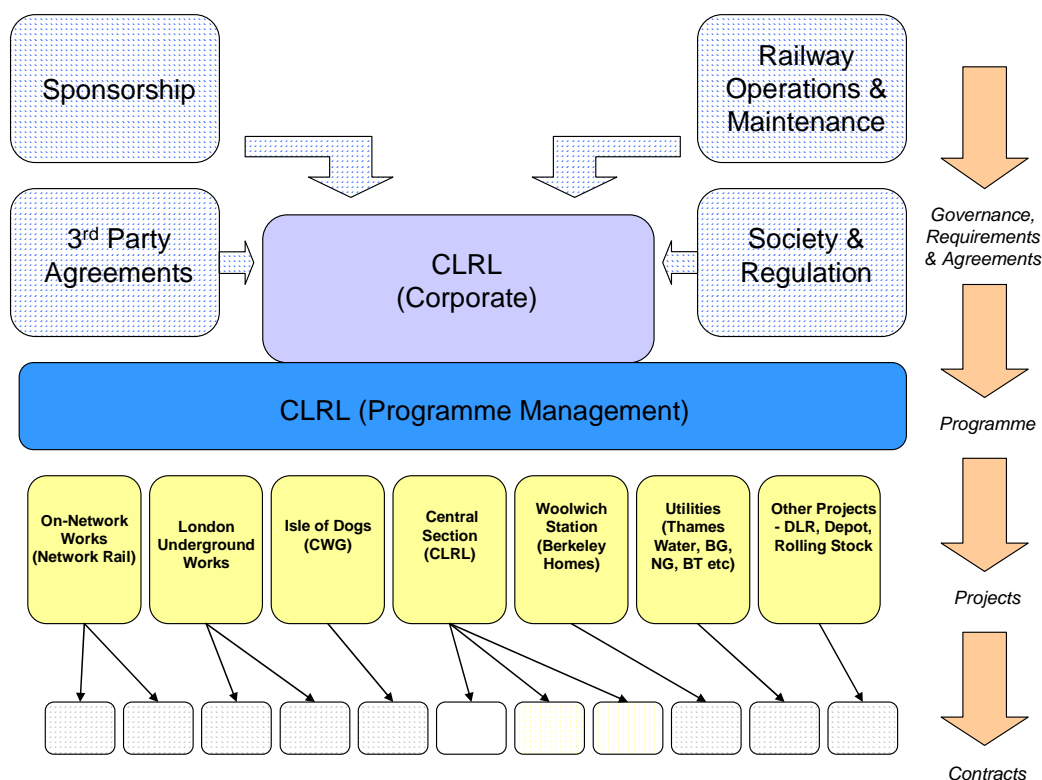


Figure 3.5.1 – Crossrail, Strategic Framework
During Delivery Phase (Post Royal Assent)

3.5.2 The strategic framework outlined in Figure 3.5.1 will be supported by an organisational framework that:

- Establishes the Programme baseline, in term of Sponsor and Operator requirements;
- Can integrate delivery organisations in terms of schedule, scope and interfaces;
- Will effect change control of baselines in terms of requirements and cost;
- Manages expenditure and risk exposure.

3.5.3 The proposed organisation is based on the need for CLRL to ensure the effective programme management of the individual elements of Crossrail being procured directly, or through Stakeholder agreements. Key aspects of the programme management role being:

- The organisation and management of the various elements and related interfaces;
- Ensuring the effective integration of all parts of the Programme to deliver the specified railway service;
- The provision of a single point of responsibility for the delivery of the Programme by the due date and within the budget set;
- The ability to foresee, with a reasonable degree of confidence, that CLRL have the appropriate authority, management structures, resources and funding to fulfil that obligation within the constraints set out by the Sponsors.

3.6 CLRL Board

3.6.1 The CLRL Board will be an independent board made up of an Executive Chairman, three executive directors and at least four independent non-executive directors. As a limited company subject to the Companies Act 2006, the directors of CLRL will owe fiduciary duties to the company including the duty to act in good faith in the interests of the company.

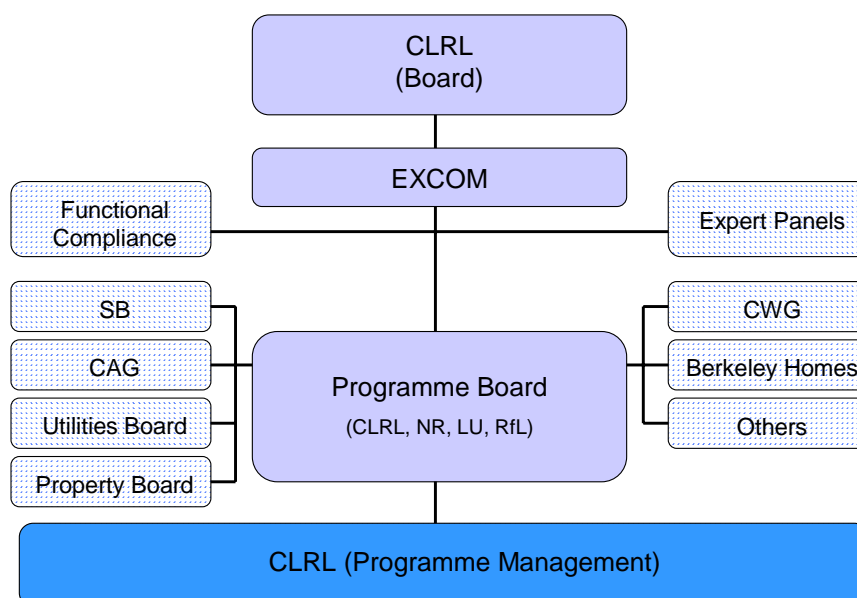


Figure 3.6.1 – Crossrail, Delivery Structure

- 3.6.2 Details of the responsibilities of the CLRL Board are set out in the Crossrail Programme Delivery Strategy together with the functions of the Board Committees. Initially these will comprise Audit, Health and Safety, Property and Remuneration. Other committees will be formed as demands dictate. Figure 3.6.1 shows the CLRL Board in relation to the proposed Crossrail delivery structure.

3.7 EXCOM

- 3.7.1 The Executive Committee (Excom) will be chaired by CLRL's CEO and will include CLRL Programme Delivery and CLRL Finance, Human Resources, Railway Services, Legal, Land & Property, Technology and Corporate Affairs.

3.8 Programme Board

- 3.8.1 The Programme Board which has been established, will be chaired by CLRL and the membership comprises NR, LU and Rail for London (RfL).
- 3.8.2 The relationships with NR and LU are outlined in Section 3.13. The heads of terms also create a special role for RfL. They will have a role both as the body which will appoint the future operator and, through the arrangement for financing, the rolling stock and depot. It is essential that operational issues are properly considered during the design, procurement, construction and commissioning phases.
- 3.8.3 The principal function of the Programme Board is to provide a forum for interface management at which senior representatives of the Industry Partners and other principal Stakeholders, when appropriate, may address significant Crossrail matters and seek to avoid or resolve issues.
- 3.8.4 Certain agreements reached at the Programme Board will be subject to ratification by other bodies or, as the case may be, in accordance with the relevant contractual agreement between CLRL and the Programme participant. The Terms of Reference for the Programme Board are outlined in the Crossrail Programme Delivery Strategy.
- 3.8.5 The following groups will interface with the Programme Board:
- Specification Board for the CPFR which is chaired by the Functional Compliance Director – the Terms of Reference are given in the Delivery Strategy;
 - Compliance and Assurance Group (CAG), which will be chaired by an independent person retained by CLRL – the Terms of Reference are given in the Delivery Strategy;
 - Utilities Steering Group, which is chaired by CLRL's Executive Chairman and is described in more detail in the Delivery Strategy;
 - Property Panel – this will amongst other things provide a conduit for the Over Site Developers;
 - Canary Wharf Group in connection with the delivery of the Isle of Dogs Station; and

- Berkeley Homes in connection with the delivery of the station box for Woolwich Station.

3.9 Specification Board (SB) for CPFR

- 3.9.1 The Specification Board will develop the Sponsors' Requirements in relation to the operating railway, including in particular NR, LU and RfL. The main output from the Specification Board will be a CPFR that is agreed by all operators and is fit for final design.
- 3.9.2 The Specification Board will also be the body through which CLRL's Railway Services team consults with the operators in relation to system trades/options proposed by the Programme and project delivery teams during the design process.

3.10 Role of the Operator

- 3.10.1 CLRL's Railway Services team will be responsible for liaising with RfL, other operators and infrastructure managers to coordinate operational input into the Programme through the Specification Board.
- 3.10.2 The role and responsibility of CLRL's Railway Services team will be to:
- Act as the specification co-ordinator and customer, providing input to the design;
 - Maintain the operational cost and performance measurement models needed to ensure a balanced value for money approach to design development;
 - Provide operational input to the Programme and project delivery teams during construction (planning) and commissioning testing phases.
- 3.10.3 The outputs of this role will be:
- Relevant sections of the Crossrail Project Functional Requirements (CPFR);
 - Operational cost information through the operations cost model;
 - Requirements for the rolling stock and depot, in conjunction with RfL;
 - Requirements for the trial running and commissioning phases;
 - Analysis of performance results through the suite of applications available within Network Rail e.g. Railsys, Trail, Oslo etc; and
 - The definition of all railway interfaces (systems, operations, performance etc).

As the specification is converted into a design, CLRL's Railway Services Team will ensure that the design meets the specification and, if necessary, is amended where required.

3.11 Role of Infrastructure Manager

- 3.11.1 Infrastructure Managers are defined in the ROGs and are, in broad terms, the organisations responsible for collaborating in the design, development and day to day operation of the new passenger railway.
- 3.11.2 The 'Crossrail' infrastructure that will need to be managed through the IM processes include the new stations, the new/ upgraded track, the signalling and the associated systems that will be used to operate the completed railway system in passenger use.
- 3.11.3 As Crossrail is not being developed and delivered for passenger service by a single organisation, a number of Infrastructure Managers will collaborate to jointly manage their own specific parts of the overall infrastructure which when combined will create Crossrail. CLRL has developed the SB and CAG in order to bring together and coordinate the interests of the responsible operators and Infrastructure Managers.
- 3.11.4 The responsibilities for specific parts of the infrastructure have been agreed further to high level discussion, regulatory requirements, current railway network ownership and the likely organisation of the operational railway.

3.11.5 Network Rail

Infrastructure Manager responsible for developing the existing Network Rail operated railway infrastructure to accommodate Crossrail – principally on the Great Eastern and Great Western Main Lines.

Network Rail will also be the Infrastructure Manager for the railway 'route way' (track, signalling, power, drainage and ventilation etc) which together forms the infrastructure on which the passenger railway service will operate and the stations on the On-Network works.

3.11.6 London Underground

Will be Infrastructure Manager for five newly constructed Crossrail Central London stations. These will directly connect into existing London Underground Station infrastructure.

3.11.7 Infrastructure Manager (non LU stations)

CLRL's Railway Services team will, in conjunction with RfL, as the Infrastructure Manager, be responsible for the remaining new Central Section stations and surface stations (Paddington, Isle of Dogs, Custom House and Woolwich).

As part of CLRL, the Railway Services team will manage the Infrastructure Manager requirements during the development of Crossrail.

- 3.11.8 All three organisations have responsibilities as Infrastructure Managers both in developing Crossrail and in the final operational railway. Since the final Crossrail Train and Station Operating Company guise is yet to be confirmed, CLRL's Railway Services team is currently acting as the 'shadow' train operating company, with handover to a franchise/ concession (to be determined) anticipated during the commissioning phase. This is so that the design of Crossrail represents the needs of a typical end user.
- 3.11.9 Part of the role that all three Infrastructure Managers must agree on is the application of relevant design, operational standards and rules to be applied. This will ensure that Crossrail operates as one overall system as opposed to three disparate organisations.
- 3.11.10 In order to develop an integrated Crossrail passenger railway system, management of any interfaces that exist between the three organisations will be pivotal to ensuring a high-performing (in all contexts) railway system.
- 3.11.11 CLRL's Railway Services team will act as the 'enabling conduit' to ensure that the operational railway is delivered through effective partnership working and excellent communications.

3.12 Shadow Train Operator

- 3.12.1 The Sponsors have agreed that Rail for London (RfL) will be the franchisor of the Crossrail Service.
- 3.12.2 It will be RfL's responsibility to determine how to establish the Crossrail operational service and, if necessary, to draw up a Train Operating Company specification for Crossrail.
- 3.12.3 In order to compile the detail, Rail for London will work closely with CLRL to ensure a complete understanding of the operational, commercial and performance characteristics of the service.
- 3.12.4 The timing of the choice of future operator will be the responsibility of Rail for London. CLRL will need to work with the prospective franchisee so that the latter can understand the intricacies of operation and the performance characteristics and abilities of the systems.

3.13 Industry Partners & Third Party Stakeholders

3.13.1 Agreements

CLRL is in the process of negotiating agreements with the Sponsors and Industry Partners relating to the delivery of the Programme. These agreements are as follows and will (insofar as relevant and at the appropriate time) be provided within CLRL's data room, along with a "CLRL Agreement Summary" paper:

- Sponsors' Agreement
- TfL Shareholder Agreement

- Project Development Agreement
- Network Rail:
- Regulatory Protocol
- Client Requirements
- DLR agreements:
- Overarching Agreement
- Property Agreement
- Works Agreement
- Operations and Maintenance Statement of Principles
- London Underground Development Agreement
- Canary Wharf:
- Isle of Dogs Station Building Development Agreement
- Works Protocol
- Berkeley Homes Woolwich Station Box Deed

3.13.2 London Underground (LU)

The Sponsors' Requirements include general requirements in relation to transport integration and specific requirements for Crossrail to interface and integrate with LU at existing stations along the Crossrail route.

LU and CLRL have worked together over several years to understand the impact of Crossrail on the LU network both in operational terms and during construction.

CLRL and LU will enter into an agreement to regulate, on a collaborative basis, the procurement and execution of the Crossrail works on, and in the vicinity of, LU stations.

The agreement will provide for prioritisation of Crossrail works in setting the Restated Terms for the PPP contracts at the Periodic Review. The respective responsibilities of CLRL and LU for procurement and management of individual packages of work will be identified in the agreement.

The key facets of the relationship between CLRL and LU are as follows, each of which is more fully described in one of more of the Project Development Agreement, the LU-CLRL agreement and other working documents:

- Infrastructure Manager – LU will become the Infrastructure Manager for Bond Street, Tottenham Court Road, Farringdon, Liverpool Street and Whitechapel stations;
- Station Operator – LU will be the station operator for these stations with overall accountability for incident management; the Crossrail train operator will manage train despatch from Crossrail platforms;
- Standards – LU standards will apply to any modifications to existing LU infrastructure; CLRL standards will apply where appropriate to all other works, subject to acceptance by LU that all safety requirements are satisfied;

- Assurance – CLRL, LU and NR will follow the jointly established Compliance Assurance Group (CAG) processes for assurance in the Central Section;
- Physical interfaces – interface works cover direct interaction with LU assets and systems as well as protection and/or monitoring of works adjacent to LU property. CLRL and LU have developed an interface schedule which describes each interface. This will form the basis, subject to change control as Crossrail designs mature, for planning of design and implementation activities;
- Access – LU and CLRL will work together to plan Crossrail works in the least disruptive and most efficient way practicable, recognising the importance of keeping London moving during an intensive period of upgrading of the LU network;

This will include working with LU Strategy and Service Development (S&SD) Events and Closures to find synergies with the Infraco and other works. The relationship between CLRL and LU will be managed through the CLRL's Programme Board.

3.13.3 Transport for London & Rail for London

As franchisor of the eventual service, RfL's involvement, apart from being part of the Sponsors' organisation, is fairly limited at present, but is expected to increase as the Programme progresses. The workload of RfL Operations can be described as:

- Specifying the 'end-user' requirements for the TOC, including Rolling Stock, in line with RfL's vision and to accept financial liability for requirements outside current cost base which may not be optimum for the Programme as a whole;
- Managing the Crossrail Access Option;
- Establishing the TOC and ensuring a seamless handover to the franchisee;
- Ensuring relevant standards applicable to TfL TOCs are incorporated within the Programme;
- Gaining strong knowledge of the railway, ready for accepting it into operational service; and
- Elements of commercial liaison with LUL and NR

Close liaison will be achieved by RfL representation on Crossrail Railway Services team and Crossrail Operations Representative at RfL Executive Board and Crossrail's Programme Board.

3.13.4 Docklands Light Railway (DLR)

Crossrail has a number of physical interfaces with the existing DLR network that will need to be managed.

- The realignment of the DLR and the construction of a new DLR station at Pudding Mill Lane, in order to facilitate the completion of the Pudding Mill Lane portal;
- The construction of a pedestrian link between Crossrail and the high level DLR station at Custom House;
- The realignment of DLR tracks between Royal Victoria and Custom House to accommodate the construction of Royal Victoria Dock portal; and
- The accommodation of parallel running between Canning Town and Royal Victoria.

The interface between RfL and CLRL will be managed through a Joint Investment Plan and will include a series of agreements relating to operations, works and land/property.

CLRL will be responsible for:

- Determining the scope of work related to the DLR network;
- Developing a governance process and maintaining the overall programme interface with DLR, ensuring design, execution, commissioning and testing meet the Programme timetable;
- The Railway requirements and systems integration;
- Standards and compliance with the Sponsors' Requirements;

CLRL objectives will include:

- Maintaining an effective working relationship with DLR;
- Achieving Programme targets;
- Containing the interface costs within the cost estimate;
- Exercising due diligence over DLR progress and likely outturn cost;
- Controlling CLRL share of costs.

3.13.5 Isle of Dogs Station

The Sponsors have agreed Heads of Terms for the Canary Wharf Group (CWG) to develop, finance and part fund Isle of Dogs Station. An agreement is under negotiation.

The agreement includes provisions for CLRL and CWG to agree the plans and for CWG to provide access for the main tunnelling and subsequent railway works.

CLRL will be responsible for:

- Determining the scope of work to be undertaken by CWG;
- Agreeing a governance process and maintaining the overall Programme interface with CWG to ensure that design, execution and ultimately commissioning and testing are properly planned and coordinated to meet the project timetable;
- Taking full responsibility for the railway requirements and systems integration across the Crossrail route;
- Standards and compliance with Sponsors' Requirements.
- Approval of the CWG design

CLRL's objectives will include:

- Maintaining an effective working relationship with CWG;
- Achieving Programme targets;
- Containing the costs related to the interface with CWG within the target costs and contingency provisions in the cost estimate;
- Exercising due diligence over the CWG progress and likely outturn cost of the station and related OSD works; and
- Controlling CLRL's share of costs.

3.13.6 Woolwich Station

The Sponsors have finalised an agreement with Berkeley Homes (East Thames) Limited, as contractor, and Berkeley Homes plc, as guarantor, to develop and part fund Woolwich station box. The agreement provides for the Secretary of State (or CLRL in its place, assuming the agreement is novated to CLRL) to make a fixed contribution to the cost of the station box.

CLRL will be afforded the powers and authority to manage the Crossrail works and related interfaces at a Programme level and to Crossrail's timetable.

CLRL will be responsible for:

- Determining and agreeing the scope of work to be undertaken by Berkeley Homes;
- Agreeing a governance process and maintaining the overall Programme interface with Berkeley Homes to ensure that design, execution and ultimately commissioning and testing are properly planned and coordinated to meet the Programme timetable;

- Taking full responsibility for the railway requirements and systems integration across the Crossrail route; and
- Exercising due diligence over Berkeley Homes' progress and likely outturn cost of the station and related oversite development works.

CLRL objectives will include:

- Maintaining an effective working relationship with Berkeley Homes;
- Achieving Programme targets;
- Containing the costs related to the interface with Berkeley Homes within the target costs and contingency provisions in the cost estimate; and
- Control of CLRL share of costs.

The agreement with Berkeley Homes provides for future arrangements to be made for the fitting out of the station. Currently there is no provision within the Sponsor's funding and no agreement with Berkeley Homes or any other external party.

3.13.7 On-Network Works

As part of the process for securing the passage of the Crossrail Bill, the Secretary of State granted Network Rail a protected provisions agreement which provides an option for Network Rail to undertake all works on their existing network.

Network Rail will undertake their works on the basis of a Regulatory Protocol. These On Network works will be funded by Network Rail and will be added to the Regulatory Asset Base (RAB).

CLRL's responsibility for the overall Programme and systems integration for the entire Crossrail route has been agreed by all parties.

The governance arrangements will build on existing working practices between the DfT and NR. The arrangement will be based on the Regulatory Protocol used on Thameslink.

Under the terms of the Regulatory Protocol, CLRL will be responsible for:

- Determining and agreeing the NR scope of work;
- Managing the programme interface with NR ensuring design, execution, testing and commissioning meet the Project timetable;
- The systems integration across the Crossrail route;
- NR liaison, monitoring that NR controls costs within the estimate for the On-Network Works.
- Monitoring NR's progress with the objective of ensuring the scope of works is delivered to schedule;

- Containing the costs within the CLRL budget;
- Maintaining an effective working relationship with NR;
- Managing industry partners and public relations;
- Submitting consents under the Crossrail Act, as requested by NR; and
- Monitoring compliance of the On-Network Works with the Environmental Minimum Requirements (including the Undertakings & Assurances).

The relationship between CLRL and NR will be managed through the Programme Board. Alignment of objectives and incentives will be a critical aspect in making this relationship a success.

In addition to the main On-Network works, there are a number other works which will be the subject of individual implementation agreements between CLRL and NR. These include:

- Interface works at Westbourne Park, Plumstead and Pudding Mill Lane, where existing Network Rail infrastructure will need to be moved to accommodate Crossrail;
- Enabling/advanced works at Westbourne Park;
- Asset protection works where Crossrail works are near or adjacent to existing Network Rail infrastructure; and
- The provision of a single ticket hall with Farringdon Thameslink Station.

3.13.8 Rolling Stock & Depot

Rolling Stock

CLRL will lead procurement of the rolling stock but with TfL involvement. The financing and other constraints are to be agreed with the Sponsors. The rolling stock is expected to be provided through a leasing arrangement, rather than direct ownership.

CLRL will exercise its responsibility for programme management and systems integration across the Crossrail route and this will embrace the vehicle and all train-borne systems.

CLRL's working assumption is that it will be responsible for:

- Determining the operations and performance requirements for the vehicles with TfL as the long term operator and developing the specification for the vehicle fleet;

- Leading in the procurement process, jointly with TfL, and ensuring the inclusion of appropriate governance processes to fulfil its responsibilities;
- Defining and managing the Programme interface with the supplier to ensure that design, manufacture and ultimately, testing and commissioning are properly planned and coordinated to meet the Crossrail timetable;
- Taking full responsibility for the railway requirements and systems integration across the Crossrail route; and
- Exercising due diligence over vehicle supply progress and likely outturn cost.

CLRL's assumption is that it will be afforded the powers and authority to manage the rolling stock project works (including the design, manufacture and commissioning of the vehicle fleet) and related interfaces at a Programme level and to meet Crossrail's timetable.

Depot

CLRL will lead procurement of the depot but with TfL involvement. The financing and other constraints are to be agreed with the Sponsors.

CLRL's current understanding is that it will be afforded the powers and authority to manage the depot project works and related interfaces at a Programme level and to Crossrail's timetable.

CLRL will be responsible for:

- Determining the operations and performance requirements for the depot with TfL as the long term operator and developing the specification for the depot facility;
- Leading the procurement process in liaison with RfL, and ensuring the inclusion of appropriate governance processes to fulfil its responsibilities;
- Defining and managing the Programme interface with the supplier to ensure that design, manufacture and ultimately, testing and commissioning are properly planned and coordinated to meet the Programme timetable;
- Taking full responsibility for the railway requirements and systems integration across the Crossrail route; and
- Exercising due diligence over depot construction progress and likely outturn cost.

3.13.9 Utilities

The Programme interfaces with approximately 60 different public utility companies, or statutory undertakers. Each of these companies has protective provisions in the Crossrail Act, and existing statute, which affords them certain rights which could influence the delivery of the Crossrail Programme.

These rights could influence the delivery of the Programme and therefore it is imperative that the Programme develops an effective and cooperative relationship with these companies. The main objectives of this relationship being to:

- Comply with legislation, Undertakings and Assurances;
- Minimise the risk to the Programme and utility assets;
- Ensure efficient delivery of diversion/protection works to time/budget, with minimum disruption to the public;
- Ensure that there are mechanisms and processes in place to agree strategies, set out day-to-day working practices and resolve disputes; and
- Control cost and schedule.

In meeting these objectives there will be a two tier engagement with the utility companies as follows:

- Executive-level tier – An infrequent engagement at which the strategy will be agreed and disputes resolved by exception; and
- Working-level tier – A day-to-day engagement at which the Programme's impact on utility apparatus will be identified and solutions agreed.

Key to this engagement is a single point of contact for the Programme's utility interface to ensure that there is a consistent approach across the whole Programme to all utility companies.

In turn the utility companies will be required to identify single points of contact within their own organisations to ensure the Programme receives a consistent message.

The structure for the development and management of the utilities interface is summarised below:

- Executive-level interface will be via the Utilities Steering Group meetings, chaired by CLRL;
- Heads of Terms have been agreed between CLRL and the main utility companies (Thames Water, National Grid, EDF Energy & BT Openreach) setting out the principles for co-operation;

- A working-level utilities team shall act as the Programme's single point of contact, developing design solutions and agreeing them with the relevant utility company;
- The focus will be on developing an integrated design (between all utility companies and the Programme) to ensure the objectives outlined above can be met;
- The working-level utilities team will have personnel placed within Crossrail's design teams to ensure consistency in design and to act as a conduit for information into and out of the utility companies;
- Operational manuals will be developed between CLRL and the utility companies to set-out and agree the design, assurance and construction process; and
- The utility companies will co-locate engineers into CLRL's design offices.

3.13.10 Oversight Developments (OSD)

The Crossrail Act 2008 empowers the SoS to acquire land and property for the purposes of constructing Crossrail and associated works. The works will be carried out by CLRL (and for some specified works by LU) as nominated undertaker.

The Act provides powers that only relate to the construction and operation of the railway. On completion, opportunities for OSD will exist. The SoS has given an Undertaking to bring forward OSD development to ensure planning applications are made within two years of commencement of work on site.

The Undertaking and policy will be implemented by CLRL to the extent that it is empowered to do so under the existing, and any future, collaboration agreements with property developers. The agreements will require these developers to make detailed planning applications for the OSDs.

For those sites which have a single owner, CLRL has already entered into such Collaboration Agreements. For the remaining sites, CLRL will progress development opportunities and seek developer interest post Royal Assent.

CLRL's current understanding is that it will be afforded the powers and authority to manage the Programme works and related interfaces with the OSDs at a Programme level and to Crossrail's timetable.

CLRL will be responsible for:

- Working with the landowners / developers to determine the optimal arrangements between OSD and railway requirements;
- HSQE issues regarding properties acquired for OSD;

- Maintaining visibility of design and planning costs which in certain circumstances fall to the SoS;
- Participating in and where appropriate leading the procurement processes with landowners / developers and ensuring the inclusion of appropriate governance processes to fulfil its responsibilities;
- Defining and managing the Programme interface with the landowner / developer to ensure that design and construction elements are properly planned and coordinated to meet the project timetable;
- Taking full responsibility for the railway requirements and systems integration across the Crossrail route; and
- Exercising due diligence over the OSD progress and likely outturn cost (particularly as they relate to any commercial interest or other residual TfL interests related to OSD performance or value realisation).

CLRL's objectives will include:

- Maintaining an effective working relationship with both TfL as the client for the OSD interest and the landowner / developers;
- Achieving Programme targets; and
- Containing the costs related to the interface with the landowner / developers within the target costs and contingency provisions in the cost estimate.

4.0 CLRL Objectives and Delivery Strategy

This section provides Tenderers with an overview of CLRL's obligations to the Crossrail Programme Sponsors and an introduction to CLRL's technical and management strategy for delivering the Programme of works, including the values CLRL wishes to promote within the Crossrail delivery team.

4.1 Overview

4.1.1 Project Development Agreement (PDA)

The authority for CLRL to undertake the Crossrail Programme is recorded in:

- The Crossrail Act and the Crossrail (Nomination) Order 2008;
- The Project Development Agreement and Crossrail Delivery Strategy; and
- A delegation of authority by the TfL Board to the CLRL Board to implement the Crossrail Programme in accordance with the Delivery Strategy.

The PDA will appoint CLRL for the management and delivery of Crossrail and will require CLRL to manage and deliver the Crossrail Programme:

- to satisfy the Sponsors Requirements;
- in accordance with the CPFR;
- in accordance with the PDA and other agreements;
- in a manner consistent with the Delivery Strategy;
- in a manner that will oblige the Operators to accept handover of assets and systems;
- to meet the Project Milestones and Target Final Delivery Date; and
- in accordance with any additional conditions that are imposed by the Sponsors as a result of the Project Review process.

CLRL will be committed to achieve this within the Sponsor Committed Funding (defined in the PDA).

Other associated agreements to be put in place include:

- The Sponsors Agreement to record the terms of the relationship between DfT and TfL as Sponsors of the Crossrail Programme and establishes the Sponsor Board; and

- The TfL Shareholders Agreement to record the undertaking by TfL to provide the committed funding for the Crossrail Programme and contains provisions relating to the governance of CLRL which are supplemental to the Articles of Association.

4.1.2 Crossrail Objectives

Overall Requirements

CLRL will act as the delivery agent for the implementation of the entire Crossrail Programme in accordance with the Project Development Agreement. To this end CLRL will deliver to the outturn cost of £15.9bn, a cost figure that must not be exceeded. CLRL will deliver the Crossrail Programme against the Project Baseline. The baseline comprises:

- the scope as defined by the Reference Design;
- the associated Cost Estimate pending finalisation of agreements and the resultant Quantified Risk Analysis; and
- the Project Delivery Programme representing the benchmark against which change will be assessed and measured.

Delivery within the terms of the Project Development Agreement also includes the primary obligation to ensure that the Sponsors' Requirements are satisfied and that the constraints imposed by the Crossrail Act 2008 and the Available Funding envelope are complied with.

CLRL's Functional Responsibilities

CLRL will perform the following key functions in relation to the delivery of Crossrail:

a) Land Acquisition

CLRL will be responsible on behalf of the SoS for managing the acquisition of:

- The land required for the development of the Central Section excluding Isle of Dogs Station and the Woolwich Station Box which will be the responsibility of the Canary Wharf Group and Berkeley Homes respectively; and
- All land required for the development of the On-Network Works which is not currently owned by Network Rail;

so as to allow Crossrail to be implemented in accordance with the Project Milestones (defined in the PDA).

b) Design

CLRL will be responsible for procuring the design of the Central Section, and for ensuring the design integration of other sections (see (f) below).

c) System Operability and Assurance

CLRL will be responsible for delivering a railway that is capable of being operated and maintained safely. It will implement assurance processes designed to ensure that the Sponsors and the Operators are satisfied that their respective interests are properly protected.

d) Overall Programme Management

CLRL will organise, manage and co-ordinate the programming of each of the different elements of the Crossrail Programme so that the progress of the various elements of the Crossrail Programme is properly planned and co-ordinated across the Crossrail Programme as a whole. This will include the processes of design, construction, commissioning, handover and completion.

In each case CLRL will manage the efficient, timely and cost-effective delivery of the Crossrail Programme.

e) Implementation

CLRL will project manage the implementation of each element of the Central Section works on a basis that is designed:

- So far as is practicable to ensure that the Crossrail Programme costs do not exceed the Sponsor Committed Funding; and
- To achieve best value.

f) System Integration

CLRL will ensure that the infrastructure, components and systems comprised in the different elements of the Crossrail Programme are compatible with each other and are effectively integrated so that the railway operates efficiently as a single working railway system in accordance with the Sponsors' Requirements.

g) System Capability

CLRL will ensure that the design, construction and delivery of the infrastructure, components and systems comprised in the Central Section, rolling stock and train care facilities are undertaken on a basis that will deliver the system capability specified by the Sponsors' Requirements.

CLRL will ensure so far as it is able that the On-Network works will also deliver the system capability specified by the Sponsors' Requirements.

h) Delivery Contract Procurement

CLRL will be responsible for the procurement and management of the Delivery Contracts (defined in the PDA) including those Delivery Contracts for the rolling stock and train care depot. CLRL will comply with Government and Local Government responsible procurement policies.

i) Contract Management

CLRL will exercise its powers and discharge its obligations under each of the Industry Partner agreements and the Delivery Contracts on a basis consistent with their objectives.

j) Rolling Stock and Depot Procurement

CLRL will lead, but with TfL involvement, the procurement of the rolling stock and depot within the financing and other constraints which are to be agreed with the Sponsors.

k) Utility Supplies

CLRL will, in consultation with RfL, NR, LU and the utility companies, procure the design, construction, commissioning and completion of the infrastructure for the utility supplies to the Central Section.

l) Lifecycle/Whole Life Cost

CLRL will endeavour to optimise the lifecycle and whole life costs of the assets comprised in the Central Section infrastructure, rolling stock, train care facilities and utilities, having regard to the need to deliver the Crossrail Programme within the Sponsor Committed Funding.

m) Land Development and Land Remediation

- CLRL will seek to ensure the proper remediation and redevelopment of the Central Section site; and
- to work with TfL to maximise the value of the property developments on a basis consistent with the fulfilment of its primary obligations.

4.1.3 Intervention Points

The PDA provides an intervention mechanism that allows each Sponsor incremental control over the Crossrail Programme should costs be forecast to exceed predetermined intervention prices or points. These Intervention Points and the rights at each point are described in the PDA.

CLRL consider the trigger of an Intervention Point a failure. The CLRL objective is to deliver without the need for any intervention by the Sponsors and performance against these intervention points will be a core KPI for CLRL.

The ExCom will ensure that targets are cascaded throughout corporate and personal objectives and that incentives are aligned accordingly. A high degree of internal assurance will be applied to performance against these targets.

4.1.4 Estimated Cost

The outturn (nominal) capital cost is £15.9Bn at the 95% confidence level, inclusive of the Central Section Project, On Network Works, Depot and the purchase of the Isle of Dogs Station.

4.1.5 Sponsors' Requirements

Crossrail's Sponsors (DfT and TfL) have issued a Sponsors' Requirements document, which sets out what Sponsors are expecting to receive from Crossrail. In support of this, a process known as Affirmation has been agreed. Through this, CLRL provides evidence to the Sponsors of how it will deliver the key elements of the Sponsors' Requirements set out in the CPFR. The material is compiled by CLRL's Railway Services Team (RST).

It has been agreed that the Sponsors will affirm three key items namely performance, resilience and demand before the end of 2008. On completion of the affirmation process changes will be dealt with through change control.

The output specification for the Crossrail programme is captured in the Sponsor's Requirements, which are to be appended to the PDA.

4.1.6 Crossrail Project Functional Requirements

The Crossrail Project Functional Requirements (CPFR) will be accepted by the Sponsors before signature of the PDA and will be subject to the affirmation process. The CPFR sets out the interpretation of the Sponsors' Requirements and provides the starting point for CLRL to prepare the designs and performance specifications.

The CPFR will also be used by the Operators to enable them to provide the services defined in the Sponsors' Requirements.

The CPFR will be frozen at the signing of agreements. From that time CLRL will be able to vary the CPFR through a change control process provided that it can demonstrate that the Sponsors' Requirements can still be met or that the Sponsors accept any change to the Sponsors' Requirements that results from a change to the CPFR.

The CPFR can be viewed in the CLRL's data room. The CPFR are subject to change control in accordance with CLRL's change control process.

4.1.7 NR Functional Requirements

Details of the NR Functional Requirements are set out in the CPFR.

4.1.8 Crossrail Reference Design

The Reference Design is the definition of the scope and design of the Crossrail Infrastructure that will satisfy the CPFR. It represents the benchmark for assessment of future design changes and is the basis of common expectations amongst participants to the Crossrail Programme. The Reference Design may be viewed in CLRL's Data Room.

The Reference Design is subject to change control by CLRL in accordance with the provisions of the PDA and the controls and methods set out and referenced in CLRL's Delivery Strategy.

4.1.9 Systems Design

The systems required to deliver the railway services specified in the Sponsors' Requirements are determined in the CPFR document prepared by CLRL's Railway Services team. The detail of certain systems will be derived from the requirements externally dictated by others such as:

- NR and LU in their respective roles as Infrastructure Managers of the railway systems and stations; and
- Where the Sponsors elect to procure certain system elements such as the depot and rolling stock separately.

CLRL will be responsible for the overall systems engineering and integration, for managing the way systems are developed and for the assurance processes. Minimally CLRL's responsibility will be to ensure that integration processes are in place to provide early warning of misalignment in the development process and evaluate options for corrective action.

4.1.10 Crossrail Programme Delivery Strategy

Under the PDA, CLRL must manage and deliver the Programme in a manner consistent with the Crossrail Programme Delivery Strategy. The Crossrail Programme Delivery Strategy is described further in section 4.2.

4.1.11 Safety

The Crossrail Vision statement gives the following key aims for H&S under its Safety First value:

- H&S Excellence as client;
- Exemplary H&S performance from consultants and contractors;
- Promoting a positive safety culture across the Programme; and
- Delivering proactive management of health and safety in design.

CLRL aims for Health and Safety excellence in its own activities and has the aspiration for Zero Accidents across the Crossrail Programme, to be achieved by a step change in Health and Safety performance from all those organisations involved in the Programme.

The principal document that gives CLRL's H&S commitment to the vision and goals above is the CLRL H&S Policy. This policy includes the four aims above from the Safety Vision, and commits CLRL to:

- H&S Excellence as CDM Co-ordinator;
- Implement H&S benchmarks for construction and rail operations that provide an effective measure for evaluating safety performance;
- Ensure that systems are in place, both within its Programme team and other consultants and contractors, to identify hazards and to reduce risk to as low as reasonably practicable for all parties affected;
- Ensure safe operation and maintenance of the Crossrail railway system through appropriate assurance arrangements for the design of infrastructure and equipment;
- Ensure employees, consultants and contractors have the training, competence and resources to discharge their responsibilities for health and safety;
- Regularly monitor, audit and review the effectiveness of the H&S management system, including this policy;
- Implement incident reporting arrangements that promote openness by staff and others in identifying safety failures without fear of disciplinary action;
- Secure the commitment and involvement of employees, consultants and contractors through effective communications and consultation, to ensure the effective promotion of H&S;
- Ensuring standards of H&S will be established, how prevention strategies will be chosen, and the procedures and criteria that will be used to monitor compliance with standards.

4.1.12 CLRL values

The following values have been produced as a result of a consultative process and form a central tenant of the way CLRL seeks to operate. These cultural aspirations are also supported organisationally by a programme of development and HR policies.

Commercially Led

- Delivering best value for money;
- Ensuring affordability;
- Developing fit-for-purpose solutions;
- Prudent investment and management of public funds and
- Customer focused.

Confident self belief

- Belief and pride in the Programme and the organisation;
- Believing that our efforts do make a difference;
- Respecting the strengths and expertise of staff and the wider team.

Strong Leadership

- We do as we say we will do;
- Visible united leadership;
- Seeking and valuing feedback from others;
- Roles and responsibilities are clearly defined.

Building the future

- Dealing effectively with uncertainty and welcoming change;
- Fostering adaptability & willingness to change as the Programme requires;
- Proactively driving towards the future;
- Committed to creating a sustainable future.

and these Crossrail corporate values are contextualised by the and most important value:

Safety First

- Health & Safety excellence as a client;
- Exemplary H&S performance from our consultants and contractors;
- Promoting a positive safety culture across the Programme;
- Delivering proactive management of H&S in design.

4.1.13 Sustainability, Skills & Training

Sustainability

The Government's strategy sets five Guiding Principles:

- Living within environmental limits;
- Ensuring a strong, healthy and just society;
- Achieving a sustainable economy;
- Promoting good governance; and
- Using sound science responsibly;

and identifies four shared priorities for action:

- Sustainable production and consumption;
- Natural resource protection & environmental enhancement;
- Climate change & energy; and
- Sustainable communities.

As part of its vision for Crossrail CLRL is *Committed to creating a sustainable future*. In pursuit of this Crossrail will be designed, as far as reasonably practicable, in accordance with the Government's strategy on sustainable development.

The key sustainability issues for Crossrail have been identified as:

- Environmental impacts during construction.
- Greenhouse Gas Emissions/Carbon Footprint.
- Resource Use/Materials.
- Excavated material.
- Workforce employment.

By definition sustainability encompasses a broad range of issues that go far beyond design development and includes the interaction with local communities and its own workforce, consideration of employment policy, health and safety, and economic impacts, as well as traditional environmental management.

As a consequence CLRL's sustainability strategy is to recognise that every activity within CLRL plays a part in the sustainability performance of the execution of the Crossrail Programme.

In accordance with the requirements of the Crossrail Environmental Memorandum, CLRL has developed (and will continue to develop) objectives under its environmental management system which address sustainability. High level champions for these objectives are identified and specific targets and action plans to achieve are developed.

Individuals are assigned responsibility for the achievement of these targets and the execution of the action plans.

Current key activities in the development of the Crossrail sustainability strategy are:

- Development of a whole life costing tool.
- Benchmarking the sustainability performance of the Scheme Design against the Bill design.

- Identification of a sustainability assessment methodology for the design of Crossrail to provide the framework for setting sustainable design targets.
- Development of strategies, pro formas, guidance documents, standards, procedures and contract documentation to achieve the requirements of the Environmental Minimum Requirements in the delivery of Crossrail.
- Incorporation of inclusivity standards as part of the design standards.
- Working with the GLA and TfL to achieve the wider benefits of Crossrail through, for example, the cost beneficial integration of Crossrail with the public realm and over site development, and the maximisation of skills and employment opportunities.

A Sustainability Coordination Group drawing from all the departments has been established to monitor progress on these and other sustainability activities and communications with TfL Corporate Sustainability group have been ongoing to ensure alignment of strategies.

Skills and Training

CLRL is fully committed to ensuring that its workforce is trained to the highest standards and that local people obtain the maximum benefits from work that is taking place in their area. These benefits include training and employment opportunities.

CLRL will expect all contractors in the supply chain to link into, and implement training programmes which will reach the maximum number of local people possible.

CLRL expects its contractors to provide training for current staff as well as new employees, so that people can update and improve their skills. CLRL wants its workforce to gain transferable skills which enable them to continue working in the construction and engineering sectors, once their role on the Programme is complete.

4.1.14 Public Sector Standards

CLRL is a public sector organisation and all employees are therefore expected to observe the highest standards of conduct. In supporting CLRL, the employees of the Programme Partner and Project Delivery Partner will be expected to observe the same high standards.

Information on the values and behaviours appropriate to the public sector has been placed in CLRL's Data Room. It is important for Programme Partner and Project Delivery Partner staff to understand these concepts and to apply them when advising and supporting CLRL.

4.2 Delivery Strategy

4.2.1 Crossrail Programme Delivery Strategy

The Crossrail Programme Delivery Strategy continues to develop and provides a summary of how CLRL will deliver the Crossrail Programme. The Strategy sets out:

- The high level objectives for Crossrail and CLRL's authority to undertake the Programme;
- A brief description of the Programme;
- The relationship between the Sponsors' requirements and the CPFR;
- The organisational framework within which the Programme will be delivered and the key senior management groups within the organisation;
- The proposed delivery framework;
- Programme and project level management structures and priorities;
- Railway operational functions;
- Engineering and assurance strategies;
- Procurement strategies; and
- CLRL's approach to land and property issues, human resources, communications and technology.

The Crossrail Programme Delivery Strategy is supported by the provisional Crossrail Programme Execution Plan (PEP) which will set out the detailed provisions as currently envisaged and will be finalised following the appointment of the Programme Partner and Project Delivery Partner.

4.2.2 Sponsor Assurance and Review

Assurance will be provided to the Sponsors that CLRL is compliant with the terms of the PDA. Assurance will centre on three aspects: cost/schedule, safety and engineering. Safety and engineering assurance are described in the Crossrail Programme Delivery Strategy. Cost and schedule assurance, at the highest level, will comprise:

- Assurance that Crossrail is being delivered within the constraints of the funding profile;
- Assurance that Crossrail is forecast to be completed within the limits of available funding;
- Assurance that CLRL are operating within the limits of the Intervention Point mechanism;

- Assurance that Crossrail is being delivered within the milestone dates prescribed by the PDA; and
- Assurance that CLRL are meeting any other performance metrics contained in the PDA.

4.2.3 Policy, Roles and Reporting

Sponsors shall be provided with reliable forecasts of Programme performance that allow them to be confident in the management of the Programme and to make decisions as required.

CLRL will prepare periodic reports (13 per annum) which will contain indicators of Crossrail's progress covering design; procurement; construction and commissioning and will include a comparison of actual against planned activities. CLRL will also produce a Semi-Annual Construction Report as defined in the PDA.

The required content for these reports is specified in the PDA but it will provide as a minimum, a report of current expenditure versus budget, progress versus plan and a forecast of the Anticipated Final Cost (AFC). The reports are a detailed reassessment of the Programme estimates and forecasts incorporating the events since the previous report.

Within the Programme, CLRL will produce reports each period for the CLRL Board and CLRL Executive Committee, in accordance with their requirements. As a minimum these reports will provide detail of expenditure and progress accompanied by trended forecasts for AFC based on known events and changes since the last Semi-Annual Construction Report.

In addition, these reports will include important programme metrics such as Health and Safety performance, approvals and consents performance and measures of compliance with the Undertakings and Assurances within the Act.

4.2.4 Crossrail Programme Review Points

Four Sponsor Review Points are set out as follows in the PDA:

- RP1 - following completion of the Parliamentary process (3Q08);
- RP2 - signing of the Project Agreements (3Q08);
- RP3 - prior to tender of the main works(3Q09); and
- RP4 - prior to contract award of agreed main works contracts (4Q10).

RP1 which included approval of Version 1 of the Crossrail Programme Delivery Strategy was completed in July 2008. RP2 relates to approval of Version 2 of the Delivery Strategy and signing of the core Agreements.

The PDA refers only to the remaining review points 3 and 4, at which the Sponsors will be entitled to decide whether or not Crossrail should proceed. The process leading up to each Review Point will be jointly planned with the Sponsors.

This process will be designed to ensure that the Sponsors are provided with sufficient information in time to allow analysis to be completed such that decisions can be made without delay to the Programme.

At Review Point 2 initial values for the Intervention Points will be set. CLRL will be measured against these values as Crossrail progresses through detailed design and procurement; however the intervention rights of the Sponsors will not apply as the Sponsors have rights to vary the Programme at the review points. At Review Point 4 the values for the Intervention Points will be reconfirmed and set. From that point the intervention rights will apply.

It will be important to jointly plan for these review points with the Sponsors and their project representative. Where practicable CLRL will seek to engage the Sponsors' project representative in a continuous assurance process such that at a review point consensus can be reached on the current Programme status based on a view gained over an extended period of time.

4.2.5 Technical Assurance

In order to bring the Crossrail train service into passenger operation a number of engineering and safety approvals will need to be put in place. These approvals will be underpinned by a progressive assurance regime that gives confidence of the integrity and quality of the deliverables.

Assurance is required to demonstrate to the approval bodies that the railway is capable of operation. Crossrail's assurance processes will also demonstrate that all other requirements have been delivered:

- Design
- Performance;
- Reliability and Availability;
- Maintainability; Standards.

The assurance regime will make use of products delivered by the Crossrail Programme's normal processes. Assurance will be driven through the products of all the engineering functions including design teams, system engineering and systems integration domains.

Overall functional safety will be assured through the Engineering Safety Management processes. Certain engineering functions, or technology specific domains, shall employ specialist assurance services which shall manage both the relevant domain risks and ensure compliance to the Engineering Safety Management processes. This shall include computer systems used for railways signalling control and communication.

Other than for those parts delivered by NR, the delivery of Crossrail will be managed within the Safety Management System (SMS), which will deliver assurance into the various Infrastructure Managers as appropriate for approval by their Independent Competent Persons (ICPs).

Approval for works affecting these parties will be required from their ICPs. The Programme has therefore established a single body, to be known as the Compliance and Assurance Group (CAG) with the power to act on behalf of all the ICPs.

4.2.6 Expert Panels

Expert Panels have been (or are being) established for Sub-surface Infrastructure, Signalling and Systems, Architecture and Procurement.

The remit for the Sub-surface Infrastructure Panel is to carry out, for CLRL and in an advisory capacity only, independent high-level peer reviews of the civil tunnelling and subsurface works.

The reviews will also cover the effect on third party infrastructure and systems (for example, track, cabling and power supply for LU operational tunnels) affected by ground movement arising from the construction of the works.

The reviews will consider whether appropriate principles and practices have been followed, so as to ensure that health and safety issues have been properly assessed having regard to the obligations on CLRL and its consultants to reduce risks to a level which is as low as reasonably practicable (ALARP).

The remit for the Signalling and Systems Panel is to review emerging thinking about the choice of systems to operate the railway. In particular, the panel will comment on the interaction of those systems when viewed holistically.

The systems include:

- Signalling including command;
- Catenary (OHLE) and interface with third rail power systems;
- Ventilation;
- Track – as far as relevant to the track borne equipment;
- Rolling Stock – as far as relevant to train borne signalling equipment;
- Cross passage doors – as relevant to ventilation and signalling equipment; and
- PEDS as relevant to ventilation and signalling.

The panel will consider designs and how they affect the performance of the railway in normal and degraded mode and consider the optimum financial expenditure against optimum performance levels. This will involve examining the design philosophy, processes and assumptions made in design development and construction of the systems.

The panel will review the eventual chosen design to ensure fitness for purpose against objectives. The terms of reference for the Architecture Expert Panel are being modelled on Sub-surface Infrastructure Panel.

The Expert Panel for Procurement will review the procurement strategy for the Programme and key individual contracts.

4.2.7 Dispute Resolution Panel (DRP)

Following consultation with professional and industry bodies, CLRL expects to establish a DRP comprising a convenor and 4-6 other core members. The core members will be highly experienced in dispute resolution and will be drawn from the main disciplines concerned with the Crossrail Programme. The objective of these arrangements will be to ensure that there will be a body of professional available at all times to handle adjudications within the statutory time limits.

4.3 Engineering Strategy

4.3.1 Systems Engineering, Integration and Assurance

The functional requirements of the systems required to deliver the railway services specified in the Sponsors' Requirements are set out in the CPFR and are discussed in detail in the Crossrail Programme Delivery Strategy. The detail of certain systems will be derived from the requirements externally dictated by others such as:

- NR and LU in their respective roles as Infrastructure Managers of the railway systems and stations; and
- Where the Sponsors elect to procure certain system elements such as the depot and rolling stock separately.

CLRL will be responsible for the overall systems engineering and integration and accordingly will need to be granted certain rights to manage the way systems are developed and the assurance processes. Minimally CLRL's responsibility will be to ensure that integration processes are in place to provide early warning of misalignment in the development process and evaluate options for corrective action. CLRL's performance measures will be commensurate with the rights afforded to manage the delivery of each element of the scheme.

CLRL is required to deliver a fully integrated and safe railway transportation system. The Systems Integration Management process will ensure, through risk assessment, planning and appropriate integration activities that all elements that make up the system are integrated such that the system performs as intended and meets the Crossrail Programme objectives and requirements.

This process covers the complete railway system assets on all parts of the Crossrail Programme, including those of NR infrastructure and at the LU and DLR interfaces. The controlling document for CLRL's approach to System Engineering and Integration is the Engineering Management Plan (EMP).

Crossrail Programme system engineering processes will comprise:

- Process planning;
- Requirements identification;
- Requirements management;
- Interface management;
- Configuration control;
- Systems integration;
- Reliability, Availability And Maintainability (RAM);
- Cross-system issues;
- Verification and validation;
- Engineering safety management;
- Technology strategy; and
- Modelling.

4.3.2 Process Planning

CLRL's strategy is to apply CENELEC standard EN 50126, "Railway Applications: The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS)", dated September 1999. Although specifically concerned with RAMS, this standard provides a model (the "V" Lifecycle") (Figure 4.3.2.1 refers) that can be used to address all aspects of the management of a project. The "Yellow Book" provides an interpretation of this specific to engineering management.

The life-cycle model can be mapped onto the Network Rail "GRIP", or Guideline to Railway Investment Process, and the London Underground E538-1 Engineering Acceptance Process for new and altered assets.

4.3.3 Requirements Management

The application of comprehensive requirements management and validation of any changes on the operational and other Stakeholder outputs is fundamental to the success of Crossrail.

The top level requirements document for the Reference Design will be the Crossrail Project Functional Requirements (CPFR). The Requirements Management Plan (RMP) will ensure that the requirements of the CPFR are tracked through the Reference Design and into the contracts and other scope assignments for the Implementation phase of Crossrail.

Other sources of requirements will be similarly tracked including environmental, sustainability and exclusivity.

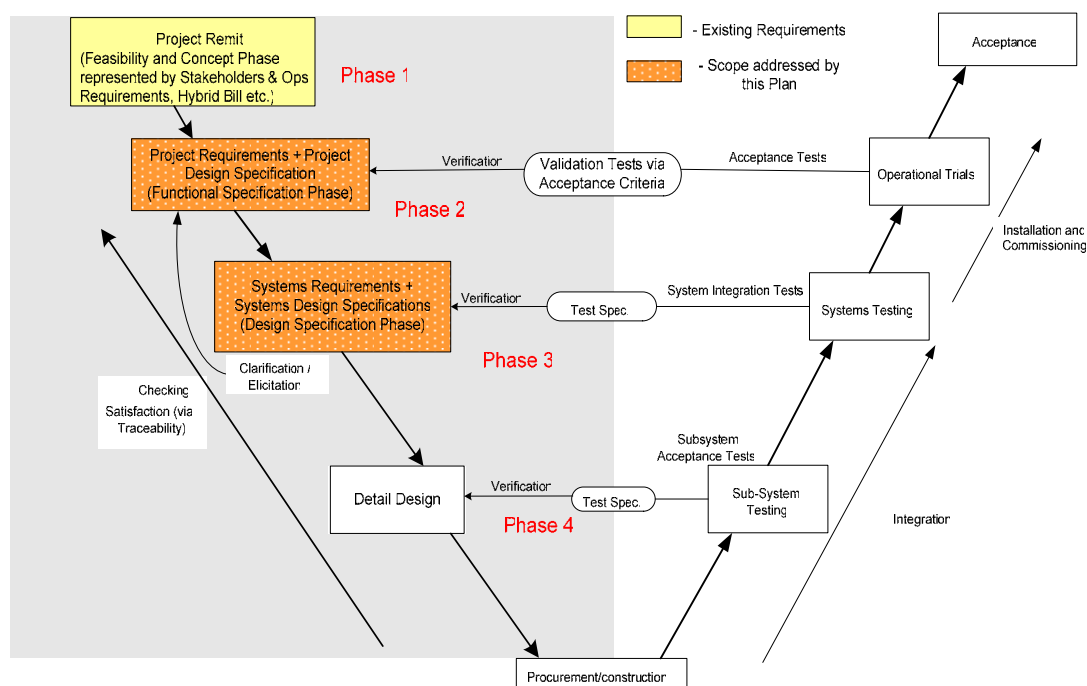


Figure 4.3.2.1 - System Engineering 'V'-Diagram

4.3.4 Configuration Control

The System Architecture Schematics and the Interfaces that are defined will be the top level documents for Design Configuration Control. They will be baselined and all design will proceed in accordance with the controlled baseline documents.

The various sub-systems will be defined and baselined at various levels of design development to freeze the sub-system architecture. Changes to baselined design documents will be managed in accordance with the Configuration Management Plan that will be developed in the early stages of the design phase. The plan will also deal with 'Configuration changes' which are changes to the built sub-system that are made so that the sub-system remains compatible with the overall system.

4.3.5 Systems Integration

The Crossrail Programme will implement Systems Integration Management process to ensure, through risk management, planning and appropriate integration activities that all elements that make up the system are integrated such that the system performs as intended and the Programme objectives are fulfilled. The process covers the complete system assets on all parts of Crossrail, including those on NR infrastructure.

CLRL, in conjunction with its Programme Partner, shall take overall responsibility as Systems Integrator. This will involve the management of the integration of individual subsystems to form an overall integrated railway. This is likely to evolve through the delivery of systems to support a series of railway configurations or baselines as part of the overall commissioning of the new railway infrastructure.

The Systems Integrator will own the responsibility for ensuring all engineering aspects are addressed by the supply chain. The System Integrator will pay particular attention to interfaces which lie between different supply contracts and with those system supplied or operated by other parties, sponsors or stakeholders (e.g. LUL, NR, DLR). Integration will be managed as a discipline throughout the project life as defined Systems Integration Management Plan and supported by System Engineering tools and processes.

A dedicated computer systems Integration function shall be responsible for the overall integration of the control systems supporting the control of the railway infrastructure. This will include control and communications systems, signalling and rolling stock. In undertaking its role as the Systems Integrator, a dedicated Interface Test Facility shall be procured as part of the integration risk management and validation process.

4.3.6 Interface Management

An important activity for CLRL will be the management of interfaces. An Interface Management Plan (IMP) will be generated that defines the controls to be applied to ensure each contractor and other parties satisfy their interface obligations.

This will be supported by a database that identifies all interfaces and allocates responsibilities. Each interface will have a specification signed off by the interfacing parties that will become one source of requirements for their design.

4.3.7 Reliability, Availability and Maintainability (RAM)

The EMP will embrace maintenance and operation aspects of the railway and ensure that the requirements are incorporated into the design and specifications of the systems.

RAM targets will be allocated across the systems in order to deliver the overall availability target for the Programme. Design reviews will ensure that these targets are being met. Compliance will be tracked throughout the design, manufacture, installation and testing phases to ensure that the systems are compatible with the way the railway shall be operated and maintained to deliver the intended performance.

4.3.8 Cross-Systems Issues

CLRL will take responsibility for setting standards and managing issues that cut across several disciplines and stakeholders. Typically these include Electro-Magnetic Compatibility, Earthing and Bonding.

These are complex issues that often cause significant delay in approvals. CLRL will therefore put in place a programme of studies and works that ensure that the issues are addressed and resolved in good time to feed into the development of the design and the approvals process.

4.3.9 Verification and Validation

The verification and validation (V&V) process will support the technical assurance function. The V&V process will ensure that 'review gates' are established at critical stages of the Programme. Progress of individual contractor's design, implementation and testing obligations will be validated against stated requirements. The V&V process will provide assurance to CLRL and its regulatory Stakeholders that the design and implementation process has been subject to defined internal controls supported by documented evidence.

4.3.10 Technical Strategy

The Crossrail Programme will be faced with numerous decisions on the technology to be applied, particularly in disciplines which are evolving very quickly such as signalling, communications and control.

This introduces three risks that must be controlled:

- Making best use of new technology to provide performance and other benefits without introducing development and approvals delays;
- The technology choices, particularly for signalling, are proprietary and therefore detailed equipment sizing and quantification cannot take place until a contract is let; and
- Civil engineering space requirements for systems will be specified before a detailed system design is produced.

Crossrail will control these risks by:

- Developing a Technical Strategy to give guidance to designers and procurers on how choices are to be made;
- Employing a small team of discipline experts with industry experience to provide input to the interface specifications defining the systems requirements to the civil engineering designers; and

- Where appropriate commissioning studies by the supply industry to understand the technologies available, their ability to deliver Crossrail's requirements, the development risks and likely space requirements. This should seek to deliver innovative solutions in a controlled and cost effective manner.
- Establishing an expert panel on railway systems and signalling to provide advice and guidance in their field.

4.3.11 Modelling

The models developed during the development phase will be developed throughout the implementation phase to ensure that the design continues to deliver the required performance.

The models currently used by CLRL are:

- Vision – determining the signalled capacity of the railway network;
- Transys – testing timetables;
- Trail – Service reliability and availability;
- Oslo – traction power demand and network design; and
- Legion and Pedroute – passenger flows.

Specific engineering models will be used for ventilation, noise and vibration and many other design issues.

All models will be kept under tight configuration control to ensure that they remain coherent one with another and accurately represent the current design.

4.3.12 Interface with Infrastructure Managers

The Railway and Other Guided Transport System (Safety) Regulations 2006 (ROGS) delegate safety approvals to the Infrastructure Managers (NR, LU, DLR and CLRL) who must have in place a Safety Management System approved by HMRI.

The surface sections will be managed in accordance with NR's Safety Management System (SMS), with a Notified Body appointed, if required. NR have been appointed Infrastructure Manager for the Central Section so this element of the railway infrastructure will also be managed under their SMS and approved by their Independent Competent Person (ICP).

The stations will be managed under the Crossrail or LU SMS as appropriate with interfaces to LU's SMS where necessary.

Technical working groups meet regularly to ensure effective interface between the Programme and the Infrastructure Managers (NR, LU and DLR) in respect of both the Crossrail works and those concurrent works which the Infrastructure Maintainers have planned.

4.3.13 Progressive Assurance

In order to bring the Crossrail train service into passenger operation a number of engineering and safety approvals will need to be in place. These approvals will be underpinned by a progressive assurance regime that gives confidence of the integrity and quality of the deliverables.

4.3.14 Rolling Stock & Depot

Rolling stock, operations and maintenance are key elements of the overall Programme and will contribute to the overall integration risk. Discussions are continuing between CLRL, TfL and DfT about the rolling stock procurement strategy. CLRL is expected to lead the procurement based on commercial funding arrangements to be determined by TfL and DfT. This will be developed over the next 6-12 months and will include a review of the interfaces with signalling and other systems.

TfL will procure a private sector operator, on a basis similar to the Overground. The chosen option will again need to form part of the Delivery Strategy. The allocation of infrastructure maintenance and the responsibility and the role of NR in the central tunnel are under consideration.

The early specification of the trains, in terms of their performance, functionality and interface to other systems will be a critical early activity for CLRL and any change to this specification driven either by CLRL or the manufacturer will have to be rigorously controlled. Various performance and reliability models will need to be used to ensure that if the train meets its specification it will integrate with the other systems to deliver the required performance.

The Old Oak Common depot works include the maintenance building, and systems to stabling and maintenance facilities. The existing operational constraints and future requirements are complex and further detailed investigations are required before finalising the procurement strategy for the new depot. The depot design and execution must also be properly integrated within the overall programme.

4.3.15 Planning, Environment and Traffic & Highways Consents

4.3.15.1 Planning Consents

Schedule 7

The Crossrail Act gives CLRL deemed planning permission for the authorised works, subject to conditions set out in Schedule 7 to the Act (S7). S7 also sets out a process for obtaining consent (formally referred to as 'requests for approval') for the details of work from the Local Planning Authority.

There are two main types of consents under S7: the details of the permanent works that will be submitted to local authorities are referred to as 'plans and specifications', whilst temporary works details to be submitted are referred to as 'construction arrangements'. A strategy for obtaining these consents has been prepared. The procedure for obtaining S7 consents requires input from a number of teams including architecture, engineering, and construction.

Listed Buildings

The Act disapplies controls under the Listed Buildings and Conservation Areas Act 1990 in relation to listed buildings which are affected by Crossrail works (paragraph 1, Schedule 9). In their place are 'Heritage Agreements' which have been entered into with each affected local authority and English Heritage. The agreements cover the site specific arrangements for listed buildings set out in Schedule 9.

Planning Consents Register/Management System

A key component of the process required in managing the submissions made under S7 and the Heritage Agreements will be the Planning Consents Register. It contains details of all the planning submissions that are anticipated based on the current scheme design and programme.

The register is regularly updated and maintained to capture and monitor all of the planning and heritage consents needed for the Programme, and to identify peaks in submissions and thereby ensure that appropriate resources are available to manage them.

Proposals Outside Act Powers

Where a proposed work does not fall within the scope the works assessed in the Environmental Statement (ES) or is outside the limits defined by the Act, the normal legislation which would have been disapplied by the Crossrail Act will apply i.e. normal town planning or listed building consent application will have to be made.

This will require additional supporting documentation, an environmental impact assessment and will have a longer determination time than a S7 consent. There is also a risk of additional construction and environmental constraints being applied to development as a LPA can use its full range of powers, and there may be the added complication and expense associated with negotiating Section 106 agreements.

In order to minimise risks to the Programme in relation to schedule delays and increased expenditure it is essential to keep all works within the scope and limits of the Act unless a strong case can be made, taking into account all cost, risk and schedule impacts, for crossing the constraints of the Act. This would be subject to extensive review within CLRL and with the Sponsors.

The CLRL change control procedures provide for checking that all design changes are reviewed for consent risk and that information is relayed to the change control panel when considering change requests.

All heritage and planning consent approvals will be subject to CLRL approval as the Nominated Undertaker.

Over Site Development

CLRL must submit full planning applications for all over site development within two years of commencement of main works at a site. Full consultation with Local Planning Authorities regarding these developments will therefore be required.

Planning Forum

CLRL and qualifying planning authorities (together with representatives from the relevant Government Departments) have established a Planning Forum ("the Forum") to help co-ordinate and secure the expeditious implementation of the planning provisions in the Act. The Forum meets throughout the design and construction period and will meet up to one year post-commissioning, unless agreed by the Forum that further meetings are no longer required.

In addition CLRL and qualifying authorities also meet at the Heritage and Design sub-group of the Forum; the Highways and Traffic sub group; and the Environmental Health sub-group.

4.3.15.2 Environmental Consents

Schedule 17

The Crossrail Act disapplies or modifies several pieces of existing environmental legislation. Schedule 17 (S17) of the Act sets out the regime to be followed where this is the case. Under S17, consent for specified works is required from the Environment Agency, British Waterways Board and Port of London Authority. These consents cover issues such as water abstraction, works within watercourses or works within the flood plain.

Other Act/EMR Related Environmental Requirements

Archaeology

Crossrail works may affect sections of the London Wall which is a scheduled monument. As required by the Planning and Heritage Memorandum this will be governed by a Scheduled Monuments Agreement agreed with English Heritage. A draft agreement has been prepared.

All archaeological work must be carried out in accordance with an archaeological Written Scheme of Investigation (WSI) which shall be based on the principles and methodologies laid down in the Crossrail Generic Written Scheme of Investigation.

Contaminated Land

A contaminated land generic activities report has been prepared and agreed with external stakeholders.

This governs the generic activities and locations at which they are relevant, and sets out a draft framework for CLRL to consider land contamination issues when carrying out these generic activities.

Water Resources

CLRL is required to provide a strategy for handling water resources issues in consultation with the Environment Agency which will be based on accepted industry practice. Consultation with the Environment Agency regarding the content of the Water Resources Strategy is currently underway.

Ecology

CLRL is required to provide a General Ecological Management Plan for consultation with local authorities and relevant Statutory Agencies including a programme for any outstanding surveys, methods for watching briefs, measures to be adopted in the event of the discovering of protected species and measures for the relocation of certain species. A draft of the General Ecological Management Plan is currently in preparation.

Environmental Management Plans (EMPs)

The Construction Code requires the production of a number of EMPs.

These are defined within the Construction Code as plans that will “... set out how” the Programme “will deliver the environmental requirements and how environmental issues that arise are handled to ensure compliance with relevant legislation and regulations and in accordance with the nominated undertaker’s environmental policies”.

The Construction Code requires that the EMPs will be discussed with relevant local planning authorities and that in preparing the EMPs, CLRL will take into account their observations.

In addition, a number of worksites are identified in the Environmental Memorandum as “environmentally sensitive worksites”. Table 6.1 in the Memorandum provides a list of the sites and the reasons for which each site is determined to be sensitive. The Environmental Memorandum sets out the intention that the EMP for these sites is to be submitted for information alongside the applications for Schedule 7 approval.

Noise and Vibration

The Control of Pollution Act 1974 (COPA) will apply to the Crossrail Programme. The Construction Code requires the nominated undertaker to obtain a Section 61 (S61) for Crossrail construction works. A guidance note is being prepared which sets out the process that CLRL will adopt when applying for S61 consents and the level of information which will be provided in support of applications. Consultation with local authorities on this guidance note is ongoing.

Existing Environmental Legislation Consents

Where existing legislation has not been disapplied or modified by the Act, it will continue to apply to Crossrail works in the usual way; for example, the Control of Pollution Act 1974, the Environmental Protection Act 1990, the Wildlife and Countryside Act 1981 and the Water Resources Act 1991 all continue to apply.

Environmental Consents Register/Management System

A strategy for obtaining all the necessary environmental consents has been prepared. The procedure for obtaining environmental consents requires input from a number of teams including engineering and construction.

The Environmental Consents Strategy sets out the scope and type of consents, the consent granting bodies and outlines of the submission processes. A Consents Management Procedure has also been established identifying processes and responsibilities within the project.

A register of environmental consents has also been established. It identifies the environmental consents, the consent granting bodies and the timescales for obtaining approvals. It is the key tool for managing and monitoring the progress of environmental consents. The register will be updated following each design stage gateway.

4.3.15.3 Highways & Traffic Consents

Act Consents

There are three categories of highways consents under the Act:

- Consents set out within Schedule 2 of the Act. These consents relate to highway accesses to Crossrail worksites and trial holes in the carriageway or footway;
- Consents set out within Schedule 3 of the Act. These relate to permanent and temporary stopping up of the highway and temporary interference to the highway. The Act effectively creates a highways consent regime in lieu of the normal highway/planning processes; and
- Consents set out within Part 1 of Schedule 17 of the Act (known as the 'Protective Provisions'). These consents generally replace legislation which is disapplied through the Act and have effect for the protection of the highway authorities.

These consents are typically required from the local highway authority, local planning authority and/or Transport for London where it is a work within London.

Existing Highways and Traffic Legislation

In addition to highway consents required under the Act, existing legislation that has not been disapplied or modified by the Act will continue to apply to Crossrail works in the usual way. Existing legislation, likely to be utilised in conjunction with powers under the Act, includes statutory procedures to make Traffic Regulation Orders under the Road Traffic Regulation Act 1984 and notification requirements under the Traffic Management Act 2004 and New Roads and Streetworks Act 1991.

Other Act Requirements

Traffic Management Plans (TMP)

The production of a TMP is a requirement of the Crossrail Construction Code and will be the responsibility of the construction contractor.

Green Travel Plans

The Crossrail Construction Code requires the production of a Green Travel Plan (GTP).

Traffic Liaison Groups

Traffic Liaison Groups (TLGs) will be established for each Borough, however, for worksites with significant traffic and highway impacts, a dedicated TLG may be set up.

Lorry Management Plans

The Crossrail Construction Code requires the production of Lorry Management Plans (LMPs). These will be provided as supporting information to Schedule 7 planning submissions to local planning authorities.

4.3.15.4 Traffic & Highways Consents Register/Management System

A Highways Consents Strategy (HCS) and a Highways and Traffic Management Strategy (HTMS) have been prepared.

The HCS identifies and explains the highway consents regime under the Crossrail Act and provides guidance on the highway consents management procedure including details of the strategy for the preparation and submission of highway consents.

The HTMS identifies and explains project requirements including the EMR requirements such as Traffic Management Plans, Lorry Management Plans and the setting up of Traffic Liaison Groups. It details statutory requirements that have not been disapplied by the Act as identified in the HCS and describes how Transport for London and internal Programme interfaces are intended to operate.

4.3.16 Compliance with Undertakings and Assurances

During the passage of the Crossrail Bill, the Secretary of State gave a number of Undertakings and Assurances concerning the Programme. These are recorded in an official register, held and published by the DfT. As a nominated undertaker CLRL is required to comply with the Undertakings and Assurances recorded in the Register of Undertakings and Assurances. The register is located on the Crossrail website.

The Crossrail Programme holds a more detailed Compliance and Commitment Register (CCR). The CCR contains the same Undertakings and Assurances as the Register but also provides the source documents and supporting/context material (for example copies of the actual signed legal agreements that are simply referred to in the register and the full text of the letters or emails which contained the undertaking or assurance). The design teams will be required to demonstrate compliance with all undertakings and assurances.

4.3.17 Utilities Strategy

Public Utilities Function

The objectives of CLRL's utilities function are as follows:

- To provide a single point of contact for the Programme's interface with utility companies or Statutory Undertakers (SU);
- To ensure there is consistency throughout the Programme with regard to utilities;
- To continue to develop a professional and cooperative relationship with the utility companies;
- To ensure compliance with legislation, Undertakings and Assurances;
- To ensure there is due regard to utilities (and their requirements) during the design process and in the assessment of cost, schedule and risk assessments of the proposed scheme;
- To delivery utility designs and diversions/protection works to time and budget; and
- To provide specialist expertise in the management of water, gas, electricity and telecoms utility companies

Current Environment

The Programme currently interfaces with 59 SUs, ranging from the large water, gas and electricity providers to the numerous small telecoms companies.

Currently there are two main bodies within the Programme who have public utility responsibilities:

- The existing designers (MDCs) have to date been responsible for the design of all elements within their geographical area, including utility diversions/protection, up to a scheme design level.
- The Enabling Works Managing Agent (EWMA) currently acts as the single point of contact from the project to the utility companies. They also plan the construction of utility diversion/protection works.

Gas	Electricity	Water/Sewage	Telecoms
National Grid (Gas)	EdF Energy	Thames Water	Openreach (BT)
Southern Gas Networks	National Grid (Electricity)	Essex & Suffolk Water	Cable & Wireless
		Three Valleys Water	COLT
		South East Water	Ntl:Telewest
			42 other telecoms

Figure 4.3.17.1 – Utility Interfaces

To achieve this, EWMA engineers co-located with CLRL's scheme design engineers (MDCs) to form an integrated design team. The objectives of this approach were to ensure:

- There was a consistent Programme approach outwards to the SUs;
- There was a consistent approach inwards to the MDCs;
- There was a single designer responsible for everything within a particular geographical area;
- This designer was responsible for ensuring the preferred scheme includes utility diversion, particularly with regard to programme (schedule), cost and risk; and
- Programme and project teams have a defined route to engage with the SUs.

It is expected that this integrated approach to design will continue during the detailed design phase of Crossrail.

A recently formed Utilities Steering Group has been set up. This is chaired by CLRL and is attended by BT, NG, EDF & TWUL. The purpose of this group is to promote cooperation, agree the high-level strategy for engagement between the represented organisations and identify further areas for cooperation and interface.

Prior to enactment of the Crossrail Act, CLRL and hence the Programme had no statutory powers. Therefore works to date have been undertaken by agreement with the utility companies.

Legislation for Engagement with SUs & Undertakings / Assurances

Engagement with the SUs is governed by two pieces of legislation:

- New Roads & Street Works Act 1991 (NRSWA) for works in the public highway; and
- The Crossrail Act for works in private land.

Whilst these Acts have different working details, particularly in the consents process (e.g. NRSWA requires the Programme to serve notice to open the highway whilst the Crossrail Act requires purchase of private land), both have similar principles, as follows:

- The SU and CLRL shall agree the measures (i.e. specification, plans, programme and cost) in advance of the works being undertaken;
- CLRL shall pay the SU reasonable or actual costs; and
- CLRL shall have due regard for SU service obligations and regulatory consents.

A number of Undertakings have been given to third parties and SUs which need to be complied with. The main generic ones being:

- CLRL will coordinate utility works;
- The SU and CLRL shall liaise in advance of the statutory notice period;
- CLRL shall minimise impacts to the SUs networks;
- All works shall comply with Crossrail's Environmental Minimum Requirements (EMR);
- The SUs and CLRL will work together to remove risk from Crossrail and the SUs networks; and
- CLRL will use contractors from SU approved lists when undertaking works to SUs' apparatus.

4.4 Programme Controls Strategy

4.4.1 Programme Office, Reporting, Lifecycle and Controls

4.4.1.1 Baseline and Change Control

CLRL's Programme Controls approach is based on the early establishment and tight control of a Programme Baseline.

The key components of CLRL's Programme Baseline are the approved Programme Schedule, the Programme Budget by work breakdown element, a comprehensive scope document defining the technical and commercial scope of services to be provided, the Crossrail Programme Execution Plan (PEP) detailing implementation methodology and the risk schedule.

Together these documents comprise the Baseline for Programme Control. The formal change process is the only means by which changes to the Baseline can be adopted.

The current Baseline is the scope, programme and budget developed to support the submission to the 2007 Comprehensive Spending Review (CSR). This will be replaced by a new Baseline during 2008 to be established prior to agreement of the PDA.

Identification, comparison and monitoring of design developments and proposed or actual changes against the Baseline will identify any potential or actual variations to the Baseline and their impact.

All changes, whether internal to the Crossrail Programme or originating from the Sponsors and Stakeholders, will be assessed. Any effects will be evaluated and controlled so that their impact on the Crossrail Programme can be managed.

This process of continuous monitoring and evaluation, or trending, supplemented by regular periodic forecasting, will be the cornerstone of CLRL's Programme controls activities. The system will ensure that all trends, whether arising from the Programme Team, from the project delivery teams or from external sources such as suppliers, Sponsors and third parties are captured.

4.4.1.2 Approach to Programme Controls

CLRL will have a Programme controls function for the whole of Crossrail; this includes the areas covered by NR, LU and other Industry Partners as well as the Central Section.

CLRL will monitor progress against plan, identify variances, recommend and implement corrective actions, and if required, modify the plan accordingly.

CLRL's approach to controlling cost and schedule will be based on the use of proven Programme control systems and processes to spot at a very early stage any changes or potential changes that might impact the schedule and / or cost.

CLRL's approach to Programme control is based on a four step process:

Step 1 – Confirmation of the baseline

Assessment of the established Crossrail Programme baseline estimate, schedule, budget and cost to ensure the most appropriate fit with the costing and budgeting structure agreed with the Sponsors.

Initially the process will be done in a "Top-Down" approach establishing confidence in sustainability of work, resource and cash flow. As Programme scope is further defined and design is progressed, a "Bottom-Up" approach will be adopted.

Step 2 - Monitoring progress

Once the baseline is validated, monitoring and control will begin to ensure milestones are met on time and within budget.

Step 3 - Identifying deviations

Early identification of deviations is critical to facilitate the development of alternative solutions, mitigation measures and recommendations to ensure the programme (schedule) is maintained. This process will be controlled with a change / trend programme.

Step 4 – Corrective Action

Undertaking a periodic reassessment of Programme and project scope cost and schedule. Determining the anticipated final cost and re-evaluating the risk register.

4.4.1.3 Elements of the Programme Controls Approach

Work Breakdown Structure (WBS)

A WBS has been established for work associated with CLRL. As work progresses and becomes more defined it may be necessary to increase the levels of the WBS to implement appropriate levels of Programme controls to improve planning, assess responsibility and improve the ability to manage and report.

Programme Baseline

The current baseline budget has been developed and approved for CLRL utilizing the CANDY system and the accompanying Programme schedule, which was initially developed in Primavera's P3 has recently been migrated to the enterprise system P6.

As previously noted this budget and schedule were developed using a “Top-Down” approach. As the Programme progresses and scope and design evolve, a “Bottom-Up” approach will be adopted.

CLRL currently have a Code of Accounts that will need to be progressed in line with scope and design development to intelligently interface and integrate all aspects of Programme controls from Planning, Estimating, Management Information Systems (MIS), Budgeting (Commitments, Costs, Trends, Change Management, and Forecasts), etc. The finalised Code of Accounts (COA) will need to be aligned with the WBS to provide a common structure for easy recognition, consistency and control of all work.

Schedule Management

A hierarchy of schedules has been developed to provide all levels of the Programme with logically prepared activities depicting the needs to be accomplished, by when, by whom and in what manner. These schedules and the reports that accompany them shall provide schedule status at different levels in the management reporting systems. There are four distinct levels within the hierarchy.

The levels of schedule hierarchy increase in detail and specificity from top to bottom. Levels I and II (Management/Control) are developed and maintained by Programme controls based on input from the project teams and scheduling data supplied by responsible contractors. Levels III and IV (Implementation / Detail Schedules) are developed by the contractors or suppliers owning them.

- *Level I – Milestone Summary Schedule (MSS).*

The MSS is developed to highlight and report overall Programme progress. Key milestone interfaces, KPIs, and events are listed with high level EPC tasks corresponding to level 1 of the WBS. The purpose of this schedule is for high level management review and reporting.

- *Level II – Crossrail Project Control Schedule (PCS).*

The PCS is a comprehensive representation of the Programme schedule workflow, logic, key milestones and resources / costs in a CPM format using Primavera P6. The PCS includes activities at a sufficiently detailed level (WBS aligned) to enable accurate integration and drives the development of the detailed schedules. This is the primary schedule management tool at the Programme level that enables the project teams to conduct “cause & effect”, recovery, resource levelling, etc.

- *Level III – Contract Implementation Schedules (CIS).*

The schedules are produced by each contractor in CPM format using P6 and covering the scope of work for their respective contracts. These schedules all support the requirements of the PCS, reflect the primary interfaces between all contracts and trades and are used as the basis to update, status and reflect overall Programme progress in the PCS.

- *Level IV – Detailed schedule tools.*

These are the most detailed and comprehensive of planning schedules / tools (corresponding to the lowest level of WBS) utilized in the schedule hierarchy. The main characteristic of the detailed schedules at this level is that they generally represent work scheduled for just 2 or 3 weeks in the future.

Level IV schedule tools may be in the form of detailed databases which summarize deliverables such as drawings, modelling, reviews, etc. for design and installations for commodities such as rail, raceway, cable, etc. for construction. Punch lists are also developed for identification of detailed activities necessary to support the testing and commissioning plan.

As lower level detailed schedules are developed they will be reviewed by CLRL to ensure compatibility with the PCS. Key to the successful implementation of the schedule hierarchy is the maintenance of the correct amount of detail at each level.

Cost, Estimating, Finance and Budget

The management of the Programme's integrated cost and finance portfolio will be accomplished from the defined scope of the work through the estimating process. Information will be organised into standard categories of labour, equipment, material, contract and other costs to facilitate on-going comparisons to actual data as it is compiled and aligned with the WBS.

As the cost estimate is developed and transmitted into the baseline budget, it will be essential that the estimate:

- Is consistent with the current technical scope definition;
- Is delineated within the WBS / COA to ensure accurate tracking, trending, and change management; and
- Is aligned with the programme schedule to ensure accurate pricing of elements such as level of effort type activities, escalation, etc.

The elements of the cost, estimating, finance and budget management system can be summarized as follows:

- **Contract Cost, Progress and Performance Control**

Contract cost control will be maintained at the individual contract level. Budgets will be established for each contract package using information in the contract award document, current budget and forecast. Awarded values (commitments) are provided by contract documents.

- **Cashflow, Forecasting and Management**

Accurate cashflow, forecasting and management are critical elements to successful execution of the multi-phase, multi-facility and multi-faceted CLRL programme.

Budgets for each element of work are spread over the schedule for that scope of work based on milestone payment and invoicing terms which are then monitored against actual costs (accruals). This allows for timely and accurate management of cash inflow and outflow by period and year for the duration of the Programme.

- **Budget Control and Forecasting**

Based on the WBS based budget, cost expenditure and variation will be tracked for effective cost and budget management.

4.4.1.4 Trend Programme

The primary objective of CLRL's trend programme is to identify, track and control the Programme scope, quality, cost and schedule. This will be accomplished through an early identification and quantification of potential changes to the baseline scope and schedule.

This early warning process provides CLRL with the opportunity to mitigate the effects of potential changes. The trend programme shall also be used as a vehicle that conveys the status of the programme evolution. The trend programme specifically allows CLRL to:

- Optimize Programme design by considering cost-saving alternatives;
- Identify changes in the scope, Programme quality and services; and
- Take corrective action before deviations are irrevocably included in the Programme.

For the Programme, early identification and fast decision-making and actions will be crucial to keeping the Programme on schedule and within budget.

4.4.1.5 Change Control

CLRL's change control process provides a method and process for identifying the impact of changes (scope and non-scope) to the Programme cost and schedule. The objectives of CLRL's change control process are:

- Early identification of an impending change in the definition and / or conditions of work execution;
- Prompt notification to management and accurate evaluation of the change with its resulting impact on cost and schedule; and
- Facilitation of timely and informed Programme leadership decision-making as a key to Programme success.

An effective change management process will be crucial for CLRL to ensure changes are effectively managed and cost and schedule impacts are identified in advance so as not to impact other areas of the Programme.

The major components of CLRL's change control processes include budget control and forecasting, trend programme, risk management and cashflow, forecasting and management.

4.4.1.6 Programme Control Reports

Programme progress reports, and periodic interim reports, shall be the main deliverables for the Programme and project delivery teams and will form the basis for a monthly review of CLRL status. These reports shall contain key indicators of Programme progress and performance comparing actual data to planned and budgeted work components. A representative outline of CLRL's monthly progress reports is as follows:

- **Executive Summary** – a summary narrative of significant events accomplished during the reporting period, progress (percent complete) curves for total programme, design and construction, critical issues and proposed resolutions. Planned major activities for the following financial period shall also be highlighted.
- **Schedule Analysis** – a schedule narrative highlighting progress against key Programme milestones along with an analysis of Programme progress with emphasis on critical path and potential problems with proposed solutions. Programme milestones and dates for the baseline, including forecast and actual dates will be tabulated. An updated Milestone Summary Schedule shall also be included along with work-in-place metrics.
- **Cost Summary** – A summary narrative and tabulation of Programme cost status including the initial value, approved change orders, current value, pending change orders, actual (accrued) cost, current forecast, and variance to budget. This report shall be summarised by contracts, COA categories, cost metrics and will include the current cashflow analysis.
- **Design Status** – A summary narrative of significant engineering activities completed by contract during the period. This information shall be provided by contractors and shall include engineering staffing curves, a tabular summary of the status of deliverables and release curves indicating forecast versus actual.
- **Procurement Status** – A summary narrative of significant procurement activities completed during the reporting period and contract award curves based on either quantity and / or cost indicating planned, forecast and actual.
- **Construction Status** – A summary narrative of significant construction activities performed by contract and milestones achieved during the period.

This shall include a list of construction activities completed, major and / or critical activities in progress significant activities planned for the next month, safety statistics, construction progress and performance, construction schedule analysis, quantity installation curves, staffing / job hour curves and action items / items of concern.

4.4.1.7 Interface with NR and other Industry Partners Project Control Systems

Subject to the requirements of the Stakeholder agreements, CLRL will cascade the Programme control systems and processes to NR, LU and the other Industry Partners for them to comply with.

4.4.2 Risk Management

Risk management is both an important management tool for CLRL's Executive, allowing management priorities to be focused, and part of the Programme cost forecasting process. Risk is managed in accordance with the CLRL Strategic Risk Management Plan and the risk is quantified through the risk model.

The risk management system at Programme level will establish predictability and control over potential variations that will be required to achieve both budget and schedule objectives. The Crossrail Programme risk management system is based on established KPIs, variation thresholds / bands, priorities, severity and likelihood of occurrence.

A risk register has been established to identify, monitor and address any undesirable outcomes from scoping, cost and schedule. Tunnelling projects potentially have high construction risks in execution due to many unknown and external elements. A thorough risk assessment and management programme is crucial including compliance with the requirements of CDM. Risk registers will also be established at Project level.

The Crossrail Programme Delivery Strategy provides a more detailed overview of CLRL's approach to risk and the risk management framework within which the Programme will be implemented.

4.4.3 Document Control

CLRL are currently in the process of implementing an EDMS system, Documentum, that will provide a robust capability to handle the vast quantity of design, vendor, construction, and operations documentation expected to be produced for the Crossrail Programme.

Current estimates indicate some five million documents with an average 3.5 revisions per document indicate that the system will be required to manage 17.5 million revisions. The system will also provide adequate disk/storage space, suitable back-up and disaster recovery facilities and procedures.

Documentum is the platform on which the Document Control system will control and manage all programme documents received from, or issued to, any and all internal and external contractors, vendors or other entities, and will be required to interface with others systems, e.g. Asset Management System and the properties database.

ProjectWise is planned to be used to conduct design reviews of CAD files & models and help coordinate remote access to drawings in process. Coordination between ProjectWise and the EDMS system will be developed using automated export and import functions.

4.5 Programme Delivery

4.5.1 Enabling Works Strategy

Through the Enabling Works Managing Agent (EWMA), a number of diverse packages of early civil works have been identified as critical to maintaining the overall Crossrail construction programme, and which are to be undertaken in advance of the main construction contracts.

A Contract Notice has been published in the Official Journal of the European Union for the procurement of framework contractors to deliver these works. The framework contracts will allow individual works contracts to be put in place quickly and efficiently.

The works include the demolition of substantial properties to enable construction of the central stations, many of which are adjacent to LU or NR infrastructure. The Utilities Steering Group, chaired by CLRL, will agree strategies for the work of the statutory utility companies and the development of the C4 utility diversion designs. The Programme team will lead on the procurement of the delivery programme with all work in any specific location being coordinated to minimise disruption and maximise opportunities for efficiencies.

The rail asset owners (NR, LU and DLR) will be responsible for the majority of rail utility diversions and enabling works affecting their assets where required.

The Programme team will continue to ensure that the scope of works is identified and that the works (including surveys, design, assurance and implementation) are procured and delivered in accordance with the Programme schedule by ensuring that they given the necessary prominence.

CLRL are currently supported by an Enabling Works Managing Agent (EWMA), Taylor Woodrow, whose contract runs through to around the end of 2009 at which time their responsibilities will pass to the Project Delivery Partner.

4.5.2 Central Section - Works Strategy

Key to the construction of the Central Section is the tunnelling strategy. Figure 4.5.2.1 identifies the proposed tunnel drives, their lengths and direction.

The development of this strategy has incorporated best tunnelling practice worldwide and builds, in particular, on the Channel Tunnel Rail Link tunnelling experience. The strategy avoids a clash with construction of the 2012 Olympics.

The Project Delivery Partner will manage the delivery of the Central Section works, in conjunction with CLRL, and within the overall Programme delivery framework established and managed by the Programme team.

The main tunnelled sections are as follows:

- Royal Oak to Farringdon;
- Limmo to Farringdon;
- Limmo to Victoria Dock;
- Stepney Green to Pudding Mill Lane;
- Connaught Tunnel Refurbishment
- North Woolwich to Plumstead (Thames Tunnel); and
- Farringdon station tunnel.

Although the present design shows 14 shafts which are required as a mixture of ventilation, evacuation, and intervention, discussions are taking place with LFEPA to reduce that number by 7 shafts. Consideration is being given to additional cross passages to align with the evacuation and intervention policies at present being studied by Crossrail and LFEPA. A study of the ventilation requirements has confirmed that 7 shafts will provide the level of ventilation required.

For practical engineering reasons, the two tunnel sections (B and C) starting at Limmo and sharing the same access shaft need to be combined in the same contract. In addition, Section D (Stepney Green to Pudding Mill) is to be built in the direction of west to east mainly to avoid problems of construction activity and waste disposal close to the Olympics site.

This will require the prior construction of main part of the Section B tunnel (Limmo to Farringdon) in order to provide a means of removing the excavated material from Section D. To avoid one contractor needing to use a tunnel being built by a different contractor this means that Sections B, C and D need to be combined.

Connaught Tunnel refurbishment involves work of a different nature and is not included in the main tunnel packaging proposals.

The Western section (Section A) comprising the bored running tunnels from Royal Oak to Farringdon and the Thames Tunnel (Section E) will constitute separate packages of work.

There are therefore expected to be four tunnel packages:

- Section A;
- Section B, C and D;
- Section E;
- Section F

The total scope for these contract works is expected to include running tunnels, station enlargements, shafts and portals.

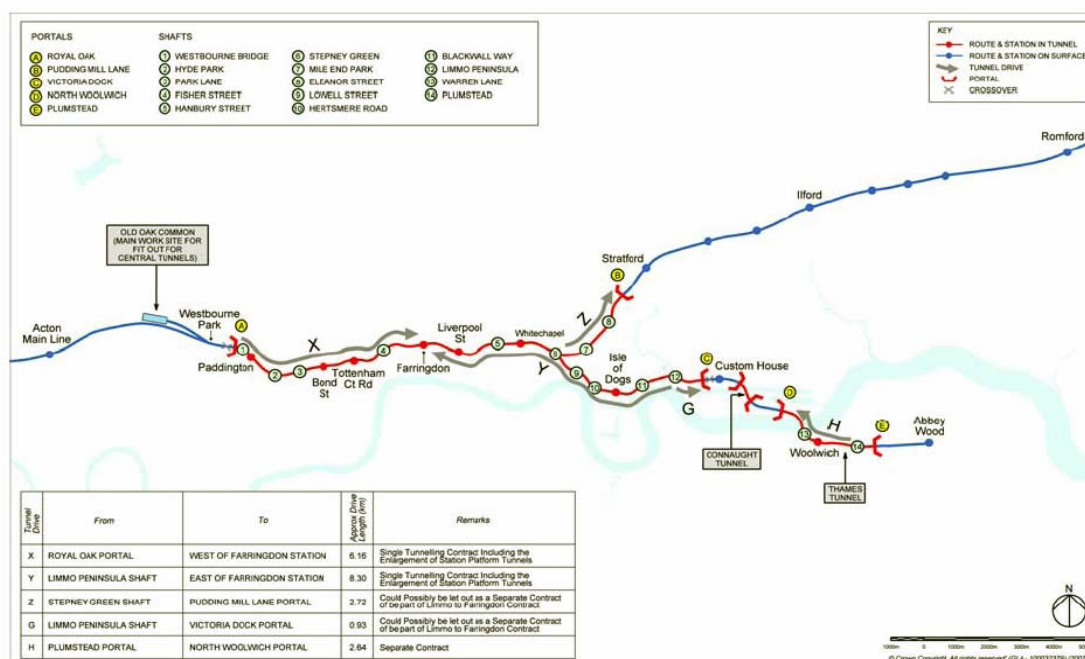


Figure 4.5.2.1 - Tunnelling

4.5.3 Central Section - Design Management

Management of design related to the Central Section works will be undertaken using tools, processes and systems specifically developed and designed to meet the specific requirements of the Central Section. The focus will be effective management, oversight and control of multiple engineering disciplines and organisations to deliver designs while achieving all the internal and external goals established for CLRL.

CLRL's processes will be co-ordinated to ensure all engineering designs and deliverables are compliant with the design criteria, consistent with both the design and construction budgets available to meet the schedule for reviews, approvals, construction, testing and commissioning. Focus areas for design management will include:

- Definition of roles, responsibilities and organisation;
- Definition of design deliverables as they relate to; engineer's design, design build and equipment supply;
- Value engineering processes;
- Design and construction phase responsibilities;
- Whole life design management;
- Engineering automation including: CAD, procurement support, construction modelling and sequencing support, design data and asset information management;

- Management of the design process to eliminate and or manage risk by employing techniques that fully comply with the requirements of CDM; and
- The management of appropriate processes to manage systems configuration and integration.

4.5.4 Central Section - Contract Administration

Administration of design and of construction contracts will provide a significant contribution towards the successful delivery of the Central Section. These contracts will vary in scope, size and complexity.

The type of contract, terms and conditions will also span a wide spectrum, the selection of each contract type being determined by an analysis process that will consider specific factors including: market conditions, extent of scope definition, most appropriate risk transfer and management strategy, schedule requirements, unique or specialist resources and equipment needs.

The objective of CLRL's approach to contract management will be to ensure that contracted requirements and commitments are delivered and that in doing so all contractual administration matters are dealt with in a timely and efficient manner, these include:

- Processing of contractor payment certificates to ensure payments are in accordance with contract payment terms;
- Ensuring proper review and verification of work completed, in terms of volume and quantity;
- Ensuring that contract required documents are submitted in a manner that complies with prescribed content and contractual time frames; and
- Processing of contract early warning, claims, change notices or other such submittals.

To facilitate these responsibilities, specific processes, procedures and systems will need to be established for the Central Section works.

CLRL will use standard contract status dashboards to provide consistent and timely analysis of contract performance. The following is an illustration of the type of data that typically will be provided in these contract dashboards:

- Schedule status, comparison of progress versus contract schedule;
- Budget status, comparison of awarded, current contract and forecast cost at completion values;
- Assessment of early warning notice activity; and
- Analysis of contractors HSQ&E performance.

4.5.5 Central Section - Interface Coordination and Clash Avoidance

CLRL's interface management processes will integrate and coordinate survey and design information with the contractors' and construction planners' schedules and assist in the review and management of complex design and construction works, interfaces, physical clashes and access restrictions.

Implementing the interface coordination and clash avoidance approach on the Programme will bring numerous advantages from conception and planning approvals through design and construction coordination to start of passenger operations.

The interface processes will allow for improved design coordination and early detection of conflicts, enhanced construction planning and mitigation of risk through better understanding and addressing issues and clash conflicts early.

4.5.6 Central Section - Construction Management

Management of the Central Section construction works will be undertaken using tools, processes and systems specifically developed and designed to meet the specific requirements of the Central Section.

Focus areas for construction management will include:

- Definition of roles, responsibilities and organisation;
- Management and co-ordination of temporary construction requirements;
- Management and co-ordination of train movements;
- Participation in design and constructability reviews;
- Support contract administration processes;
- Co-ordination of surveys and other engineering data;
- Management of construction contract interfaces;
- Liaison, co-ordination and briefing of third parties (NR, LU, DLR, Thames Water, National Grid etc);
- Construction supervision: can vary from self certification by the contractor to full "Engineers representative";
- Review of contractors proposed plans, methods statements and procedures;
- Co-ordination of site establishments: welfare facilities, site security and site set-up;

- Management and co-ordination of construction logistics;
- Management and co-ordination of site access and traffic control;
- Identification and booking of possessions (for non-network rail delivered works);
- Management and co-ordination of instrumentation and monitoring activities; and
- Provision of progress and reporting data and analysis.

4.5.7 Central Section – Completion & Handover, Civils Works

Completion of the Central Section civils works will be completed in a sequential manner and will then be handed over to the railway systems contractors.

The focus for this completion and handover process will cover:

- Tracking of completion of the Works towards the date of completion;
- Tracking of all supporting and associated documentation and records, including review and approval thereof;
- Demonstration that the status of the works and supporting documentation show that the contract is complete;
- The establishment of meetings and inspections, in include all necessary parties, to participate in final completion inspections and handover; and
- The ongoing management and close out of the contracts to cover such elements as tracking and control of outstanding works and defects and final demonstration by the contractor.

4.5.8 Third Party Works

The design and delivery of the Central Section works need to recognise and be planned and developed alongside certain those elements being delivered by third parties:

- Network Rail for the On Network Works;
- Canary Wharf Group for the Isle of Dogs Station;
- Berkeley Homes for the Woolwich station box and fit out (subject to funding); and
- Other third parties for the supply of vehicles and depot facilities.

The design and delivery of the Central Section works also need to recognise and be planned and developed alongside certain other third party projects that are independent of Crossrail including:

- London Underground projects to upgrade lines and stations as part of its investment programme;
- Docklands Light Railway projects including its Stratford International Extension and 3-car line upgrade projects; and
- 2012 Olympics infrastructure and transport projects.

The basis for CLRL's technical and management interface with these third parties is being defined through a series of protocols and implementation agreements and CLRL will need to develop its delivery strategy to suit these emerging requirements.

Network Rail

CLRL's functional and management client requirements in relation to Network Rail are set out in a draft CLRL document "Network Rail Client Requirements". This document covers what Network Rail is required to deliver in terms of infrastructure capability as well as Network Rail's contribution to CLRL's programme management of the Crossrail Programme. The key interfaces between CLRL and Network Rail, as envisaged by this document in July 2008, can be summarised as:

Land Acquisition

CLRL will, acting as the Secretary of State's agent, be responsible for managing the acquisition of:

- The land required for the development of the Central Section; and
- All land required for the development of the On-Network Works which is not currently owned by Network Rail;

so as to allow the Programme to be implemented in accordance with the approved Programme control schedule.

Design

CLRL will be responsible for procuring the design of the Central Section, and for ensuring the design integration of other sections.

Network Rail will be responsible for procuring the design of the On Network Works.

System Operability and Assurance

CLRL will be responsible for delivering a complete railway that is capable of being operated and maintained safely. It will implement assurance processes designed to ensure that the Sponsors and the Operators requirements are satisfied that their respective interests are properly protected.

Network Rail will be responsible for ensuring the On Network and route wide railway systems infrastructure capability is capable of being operated and maintained safely.

Overall Programme Management

CLRL will organise, manage and co-ordinate the scheduling of each of the different elements of the Crossrail Programme so that the progress of the various elements is properly planned and co-ordinated across the Crossrail Programme as a whole. This will include the processes of design, procurement, construction, commissioning, handover and completion. CLRL will be responsible for implementing programme controls across the Programme and for providing regular reports on progress and expenditure to the Sponsors.

Network Rail will be responsible for programme management of the On Network Works and providing information in accordance with the requirements set out in this document to enable CLRL to fulfil its obligations.

Cost and value

CLRL will project manage the implementation of each element of the Central Section works on a basis that is designed:

- To ensure that the Programme costs do not exceed the Sponsor Committed Funding; and
- To achieve best value.

Network Rail will be responsible for controlling the On Network Works costs and for providing regular reports to CLRL. It will be responsible for establishing an efficient price and then for the efficient delivery of the On Network Works in accordance with the provisions of the Protocol.

System Integration

CLRL will ensure that the infrastructure, components and systems comprised in the different elements of the Crossrail Programme are compatible with each other and are effectively integrated so that the railway operates efficiently as a single working railway system in accordance with the Sponsors' Requirements.

Network Rail will be responsible for ensuring system integration within the On Network works and for satisfying themselves as Infrastructure Manager regarding the systems integration of the end to end railway systems.

System Capability

CLRL will ensure that the design, construction and delivery of the infrastructure, components and systems comprised in the Central Section, rolling stock and train care facilities are undertaken on a basis that will deliver the system capability specified by the Sponsors' Requirements.

Network Rail will be responsible for ensuring the sufficiency of the infrastructure capability of the On Network Works and the end to end railway systems.

Delivery Contract Procurement

CLRL will be responsible for the procurement and management of the delivery contracts including the delivery contracts for the rolling stock and train care depot.

Network Rail will generally be responsible for the procurement and management of all delivery contracts pertaining to the On Network Works.

Contract Management

CLRL will exercise its powers and discharge its obligations under each of the Industry Partner agreements and the delivery contracts on a basis consistent with their objectives.

Rolling Stock and Depot Procurement

CLRL will procure the rolling stock and depot within the financing and other constraints which are to be agreed with the Sponsors.

Network Rail will work with CLRL and the rolling stock and depot provider(s) to allow CLRL to fulfil its obligations and the suppliers to deliver infrastructure and facilities in accordance with the milestones set out in the approved project controls schedule.

Utility Supplies

CLRL will, in consultation with Rail for London and London Underground, procure the design, construction, commissioning and completion of the infrastructure for the utility supplies to the Central Section.

Network Rail will be responsible for arranging all utility supplies in connection with the On Network Works and supporting CLRL in securing utility supplies to the Central Section.

Lifecycle/Whole Life Cost

CLRL will endeavour to optimise the lifecycle and whole life costs of the assets comprised in the Central Section infrastructure, rolling stock, train care facilities and utilities, having regard to the need to deliver the Crossrail Programme within the Sponsor Committed Funding.

For On Network assets, Network Rail will be responsible for demonstrating to the ORR that the capital cost represents an efficient price and within this will be responsible for deciding its approach to whole life costs.

Public Affairs

CLRL will be responsible for the management and delivery of the Programme's internal and external communication strategy.

CLRL will together with its works partners and the sponsors, develop and manage a community relations framework to fully engage all affected communities and other stakeholders along the route.

Network Rail is required to work with CLRL in co-ordinated manner to ensure mutual objectives are satisfied.

Environmental Management and Planning, Environmental and Traffic & Highways Consents

As the overall Programme manager for Crossrail, CLRL will establish the framework for complying with the EMR through the establishment of an Environmental Management System (EMS) that is consistent with the principles of ISO14001, and delivery of strategic documents agreed with statutory bodies as set out in the Environmental Minimum Requirements (EMR) including but not limited to the Generic Written Scheme of Investigation, Crossrail Route Wide Generic Activities Land Contamination Report, water resources strategy and general Ecological Management Plan.

CLRL will define the strategies and content (including standard text, pro formas and template documents) for obtaining all the environmental, planning and traffic and highways consents under the Act.

Network Rail and its main contractors for Crossrail will operate an EMS consistent with the principles of ISO14001 and ensure that their objectives and procedures are appropriately aligned with CLRL's.

Network Rail will be responsible for preparing the information for all the necessary planning, environmental and traffic & highways consents to be obtained under the Crossrail Act. Any consent under the Act must be submitted by the nominated undertaker and will therefore be submitted by CLRL.

Network Rail will be responsible for preparing, submitting and obtaining all the necessary planning, environmental and traffic & highways consents under non-Act legislation in a timely manner and in accordance with the NR Baseline project control schedule.

Network Rail shall review the design in consultation with CLRL where it develops or changes from the Bill Scheme to ensure that the proposed design is within the limits of the Act.

4.6 HSQE Strategy

4.6.1 Principles

The magnitude and complexity of the Crossrail Programme; extent of Stakeholder and infrastructure interfaces; proximity of construction to the public and to operational railways; and high visibility in a capital city, all demand exemplary performance in each aspect of HSQE. This will be achieved through full compliance with statute, codes, standards and Crossrail Act requirements. The following eight principles form the basis for the HSQE business management system used by CLRL:

- *Customer focus*

Organisations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to achieve customer expectations.

- *Leadership*

Leaders establish a unity of purpose and direction of the organisation. They should create and maintain the internal environment in which people can become fully involved in achieving the organisation's objectives.

- *Involvement of people*

People at all levels are the essence of an organisation and their full involvement enables their abilities to be used for the organisation's benefit.

- *Process approach*

A desired result is achieved more efficiently when activities and related resources are managed as a process.

- *System approach to management*

Identifying, understanding and managing interrelated processes as a system contribute to the organisation's effectiveness and efficiency in achieving its objectives.

- *Continual improvement*

Continual improvement of the organisation's overall performance should be a permanent objective of the organisation.

- *Factual approach to decision making*

Effective decisions are based on the analysis of data and information.

- *Mutually beneficial supplier relationships*

An organisation and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

4.6.2 Overview

The CLRL Executive Committee (EXCOM) will be ultimately responsible for HSQE during the design, construction and handover stages of the Programme, however, through CLRL's HSQE management systems responsibility will be devolved through the integrated Programme team, through functional management, the Project Delivery Partner, Industry Partners, line managers and supply chain partners.

Detailed below is a list and description of fundamental requirements, which shall be implemented by the CLRL client / Programme team, the Project Delivery Partner and supply chain partners to demonstrate effective and efficient management.

This list does not address issues relating to material or product quality, (grade, attributes, etc), such information is contained in design output data e.g. drawings, specifications, datasheets, legislation, etc.

Quality Management System (QMS)

The integrated Programme team, the Project Delivery Partner and all key supply chain partners shall actively operate an approved QMS based on the 'best-practice' model BS EN ISO 9001, which is certified by a UKAS accredited certification body.

Each organisation shall ensure their company QMS integrates with the CLRL Business Management System (BMS).

Environmental Management System (EMS)

The integrated Programme team, Project Delivery Partner and all key supply chain partners shall actively operate an EMS that is consistent with the principles of BS EN ISO 14001.

Occupational Health & Safety Management System (OHSAS)

The integrated Programme team, Project Delivery Partner and all key supply chain partners shall actively operate an H&S management system that meets the requirements of the 'best practice' model BS OHSAS 18001.

Programme Execution Plan

The integrated Programme team, Project Delivery Partner and key supply chain partners shall develop or refine Programme and project execution plans and supporting documentation to describe how they will manage the delivery work (products and services), in order to assure that project objectives will be met.

The Programme Execution Plan (PEP) is the key management document governing Programme and project strategy, organisation, processes, procedures, responsibilities and the relationship between the relevant sponsor and the delivery management team.

The PEP is a formal statement of the user needs, brief and strategy agreed with the delivery manager for their attainment. The plan is a live and active management document, regularly updated, to be used by all parties both as a means of communication and as a control and performance measurement tool.

The “sponsor” must be satisfied that the PEP represents a viable and realistic plan for implementation and achieving stated objectives. The “sponsor” shall review the PEP in detail with all parties to ensure that they understand the plan as a whole and their own responsibilities and that they have the capability and resources to discharge their responsibilities.

Business-wide Systems & Processes

A number of core processes are defined in the CLRL Business Management System (for example, cost management, programme management, risk management, business planning, design management, etc). It is mandatory that the integrated Programme team, Project Delivery Partner and key supply chain partners comply with these and other business wide arrangements that are applicable to their work.

“sponsor”

There shall be an identifiable ‘sponsor’, internal or external to the project, for all work undertaken by project teams and their supply chain organisations.

Specification

‘sponsors’ are responsible for defining requirements, to an appropriate level, for a scope of work. Requirements are the inputs for the work to be undertaken and provide a factual basis on which to demonstrate the acceptance / rejection of work output.

Specification Review

The integrated Programme team, Project Delivery Partner and key supply chain partners are responsible for reviewing ‘sponsor’ requirements to ensure that they are adequate and clear. They are also responsible for resolving any areas of ambiguity and for verifying that they have the resources and capabilities to undertake the work. Records of reviews shall be maintained.

Requirements Capture & Tracking

The Programme and Project delivery teams shall establish a formal system for identifying and tracking compliance with requirements.

Management System Records

All certificates, reports, measurements, methodologies etc. shall be maintained in a document control system. All significant Programme documentation shall be held in the Programme document management system. Records shall comply with requirements defined in procedures and any other requirements documents. Records shall be sufficiently detailed to provide assurance of compliance with all requirements.

4.6.3 Business-Wide Requirements

All teams and their key supply chain partners shall comply with business-wide arrangements and processes, which are captured in the 'Business Management System' (BMS), and are published through the CLRL Intranet (Workplace).

'Business-wide' management issues and arrangements are under the jurisdiction of CLRL's HSQE management teams. The nature and extent of the management system documentation shall be to a level appropriate to the risk and significance of the activity to the Programme / project.

Programme and project delivery teams are responsible for ensuring that appropriate interfacing and coordination arrangements are established across their supply chain organisations.

The organisation and responsibilities for HSQE management within a given team will be dependent on a number of issues; typically the type of works being undertaken and the current stage of that work. Detailed arrangements shall be determined and established within Programme and project execution plans.

4.6.4 Quality Plans

CLRL and its appointed Programme Partner will establish an approved Quality Management System which is registered by an independent accredited certification body, as meeting the requirements of ISO 9001. CLRL will take the lead in establishing the Programme Quality Plan, setting out a management systems framework and acting as custodian for Programme-wide procedures and templates.

These documents will be available across the network, together with systems for managing queries, reporting KPIs, tracking non-conformance reports, corrective action reports and site observations to closure.

4.6.5 Safety Management

A Strategic H&S Management Plan document ref CR-SMS-S-0177 has been developed to direct the CLRL approach to managing health and safety risks.

It is aimed at both an internal audience (i.e. CLRL and its supply chain) and external parties, i.e. Stakeholders and regulators. The current version of the Strategic H&S Management Plan document contains high level principles applicable to the Programme Partner role. These include a commitment to H&S excellence to be achieved through the key drivers of:

- Client leadership and commitment to continuous improvement, including continuation and development of CLRL's Safety Leadership programme;
- The Programme and project delivery teams and supply chains; and
- Addressing people issues through effective communications and reporting, with intervention strategies and programmes supporting a positive safety culture and encouraging continual and measurable improvements in behaviours

The Strategic H&S Management Plan covers the Programme management role in co-ordinating H&S arrangements and communications with the delivery agent organisations responsible for delivery elements of the Programme on behalf of CLRL. (Some organisations have both Stakeholder and delivery agent roles). These include:

- The Central Section for design and construction of central area stations and rail infrastructure;
- Network Rail and London Underground for design and construction of surface level their respective infrastructure - the safety requirements in conjunction with rail access and possessions are considerable and the need for good management of the interfaces with LU and NR is paramount;
- Utility companies for design and construction of service diversions and energy supply elements of the Crossrail Programme;
- Canary Wharf Group for design and construction of Isle of Dogs station; and
- Berkeley Homes for design and construction of Woolwich Station.
- Rolling Stock – to be confirmed
- Depot and Train Care Facilities – to be confirmed

The framework for the Programme Partner's review of H&S arrangements for each of the major delivery agents is set out in the Strategic Risk Management H&S Risk Map (doc ref 10102006-MP93-7SUT).

The Programme Delivery Partner will assist and provide resources for the H&S assurance required by CLRL from the Delivery Agent organisations implementing elements of the Crossrail Programme. Depending on the nature of the works, CLRL will require H&S assurance from these Delivery Agent organisations, and may itself require to provide H&S assurance to them

CLRL is seeking to incorporate appropriate H&S assurance provisions in the Development Agreements currently being drafted for each of these Delivery Agent organisations. Assurance provisions will also include Quality and Environmental undertakings as appropriate.

CLRL will determine the policy and strategy for the H&S assurance to be provided to and received from Delivery Agent organisations, in agreement with those organisations. The detailed arrangements and resources for undertaking this assurance process will be developed jointly by CLRL and its Programme Delivery Partner organisation. The Programme Delivery Partner will provide the resource required to support the H&S assurance process when developed.

Programme-wide strategies and site-specific plans will cover each of the following at all sites:

- Emergency planning;
- Behavioural Management of Safety;
- Accident & Incident Management, and Emergency Management;
- Risk management and mitigation; and
- Performance monitoring and use of leading and lagging indices, standardised across the Programme, will provide further opportunities for improvement.

The Strategic H&S Management Plan document will be developed and regularly reviewed as the Programme and project organisations and roles develop. The CLRL Health and Safety function will interact at all levels of the Programme, beginning with defined responsibilities in governance and managing strategic risk at Board level. The assessment and mitigation of risk will be a key activity at each level.

The Project Delivery Partner role relates to the design and construction of the Central Section and the Safety Strategy for that role will cover development of a detailed Construction Safety Strategy safety and assurance strategy, with subsidiary strategies for:

- Construction security;
- Occupational health;
- Tunnelling and Sprayed Concrete Lining;
- Fire Safety;
- Demolition activities;
- Traffic Management; and
- Hazardous substances, including Asbestos and Contaminated Land.

4.6.6 Environmental Management

Environmental Requirements

An Environmental Statement (ES) was submitted with the Hybrid Bill in February 2005¹. The ES identifies the likely significant impacts that will arise from the construction and operation of Crossrail and identifies measures to reduce or mitigate those impacts.

The Secretary of State has made a statement of intent that Crossrail will be carried out so that its impact is as assessed in the ES. A set of Environmental Minimum Requirements (EMR) have been developed to assist in achieving that statement.

As nominated undertaker, CLRL is required to adhere to the arrangements set out in the EMR when designing and constructing Crossrail.

The EMR comprises the Construction Code, the Planning and Heritage Memorandum, the Environment Memorandum, and all the Undertakings and Assurances concerning the Programme specified in the "Crossrail Register of Undertakings and Assurances" published by the Department for Transport.

It is a requirement of the EMR that CLRL develop and implement an Environmental Policy and an Environmental Management System (EMS) consistent with the principles of ISO 14001 for the Programme.

The issue of environmental consents is considered further in the earlier sections.

CLRL's Environmental Management System

Development of the CLRL Environmental Management System to cover all Programme phases to operation is well advanced. The EMS contains a number of processes and procedures that give effect to the requirements of the Act and the EMR thereby acting to manage compliance with them.

CLRL's EMS is an integral part of its Business Management System (BMS) and is being developed alongside the Quality Management and Health and Safety Management Systems to ensure the three disciplines are integrated and compatible. All those working on the Programme from delivery partners through to design consultants and contractors are required to comply with the provisions of the EMS.

¹ Since the deposit of the Bill in 2005, a number of changes to Crossrail have been identified as a result of discussions with Stakeholders and continued Programme development. As a result the ES was supplemented by further environmental information in May 2005, January and November 2006 and May 2007 as well as environmental assessment of Additional Provisions deposited in January, May and November 2006 and May 2007.

4.7 Procurement Strategy

4.7.1 Procurement Strategy

A key component of the overall Programme Delivery Strategy is the Procurement Strategy. The aim of the Procurement Strategy is to identify the preferred way of delivering the Programme objectives in a manner that ensures value for money, which includes the main priority to deliver within the stated outturn cost figure.

The Procurement Strategy has been aligned with the vision, values, priorities, constraints, the broader policy environment and current procurement best practice advice.

The Procurement Strategy also needs to be compatible with the financing model, which formed the basis of the 2007 Crossrail funding agreement, and must deliver contract expenditure profiles within the available funds. The funding solution is highly customised, reflecting the scale and complexity of Crossrail.

4.7.2 Procurement Policy and Legal Framework

The primary policy drivers and best practice guidance that have been taken into account in the development of CLRL's Procurement Strategy are:

- OGC Achieving Excellence in Construction Procurement Guides and the OGC Common Minimum Standards;
- HM Treasury's Transforming Government Procurement, January 2007;
- HM Treasury's Infrastructure Procurement: delivering long-term value, March 2008;
- OGC Gateway Process;
- NAO reports on the construction industry;
- Strategic Forum Construction Commitments;
- Standardisation and off-site fabrication best practice;
- Government sustainable procurement policy;
- The Mayor for London's Strategies for London and TfL policies; and
- European Directives and Procurement Regulations

4.7.3 Procurement Regulations

CLRL's role in developing and delivering a new railway across London means that it is defined as a Utility. The procurement procedures for contracts above the relevant financial threshold must therefore be compliant with The Utilities Contracts Regulations 2006 ("the Regulations"). The Regulations include:

Procedure Options

Part 3 of the Regulations covers the use of the open, restricted and negotiated procedures. The selection procedures to be used by CLRL will either be restricted or negotiated.

The negotiated route is expected to be adopted for the major construction services and works contracts. This will allow the suppliers' proposed approach to these complex contracts to be optimised to deliver better value.

The Regulations do not refer to competitive dialogue, but appropriate aspects of this approach as set out in the Public Contracts Regulations 2006 may be incorporated into contracts that are awarded using the negotiated procedures.

Qualification and Selection of Economic Operators

Part 4 of the Regulations covers the use of qualification systems and the criteria for rejection and selection of economic operators for tender lists. Industry supplier qualification schemes such as Link-up (provided by Achilles) will be used where appropriate to ensure an efficient pre-qualification process.

However, major construction and systems contracts will be fully advertised through the OJEU Contract Notices procedures to ensure that all potential suppliers have the opportunity to bid for work packages.

The Award of a Contract

Part 5 of the Regulations covers the criteria for the award of a contract. In accordance with the Regulations, Crossrail may award contracts on the basis of the following criteria:

- The lowest price offer; or
- The most economically advantageous offer from the view of the utility.

Most Crossrail contracts, including all of the major engineering contracts, will be awarded on the basis of the most economically advantageous offer from the point of view of CLRL.

4.7.4 Procurement Principles

CLRL will adopt best practice principles which are aligned with the above policy drivers to safely deliver a world class railway to time and to budget. The key principles to be adopted are:

- Deliver affordable best value;
- Engage with the supply chain as early as possible;
- Contracts based on a sensible allocation of risk to the party best placed to manage them;
- Responsible and sustainable approach to procurement;
- Selection of suppliers based on best value;
- Robust contractual performance management frameworks; and
- Collaboration with other clients to achieve smart purchasing and deliver savings and efficiencies.

A key component of the delivery of best value is the allocation of risk between the client and the supply chain. The Crossrail Procurement Strategy seeks to achieve a sensible approach to risk by allocating Programme risks to the party best placed to manage the risk. In taking forward the procurement arrangements the optimal balance of risk will be sought by assessing the impact of risk allocation on the achievement of value for money.

The CLRL attitude to risk is to allocate it sensibly to the party best able to manage the risk. This will be reflected in the development of the contracts to be used for the delivery of the Programme and this approach will help attract the best suppliers and help ensure good competition.

It will also be important for the procurement arrangements to encourage and incentivise all parties to continue to investigate and implement improvements and efficiencies. The contractual arrangements will incentivise effective risk management with the objective of delivering the Programme within budget and on time.

4.7.5 Responsible Procurement

“Responsible Procurement’ is broadly accepted to mean obtaining goods, works and services in ways that do not jeopardise the lifestyle of future generations. CLRL has identified the key Responsible Procurement issues for Crossrail and has developed an approach through which appropriate processes will be developed and implemented.

Background and commitment to Responsible Procurement

The Mayor's vision is for London to be an exemplary, sustainable, world city. The objective is to create a better quality of life for London's communities now and in the future. The Crossrail Programme will play a major role in helping to deliver this vision and will be aligned with the GLA Group Responsible Procurement Policy ("the GLA Group Policy"), which identifies three key principles:

- Strong and diverse economic growth;
- Social inclusivity to allow all Londoners to share in London's future success; and
- Fundamental improvements in environmental management and use of resources.

The GLA Group Policy aims to improve sustainability through procurement across the following seven themes:

- Encouraging a diverse base of suppliers;
- Promoting fair employment practices;
- Promoting workforce welfare;
- Meeting strategic labour needs and enabling training opportunities;
- Community benefits;
- Ethical sourcing practices; and
- Promoting greater environmental sustainability.

Implementing Responsible Procurement

CLRL will implement the GLA Group Policy as an integral part of its procurement processes and procedures. Internal guidance material is being developed that turns policy into actions appropriate to the specific characteristics of the goods, works or services in question.

Processes will include templates for pre-qualification questions, invitation to tender requirements and contractual provisions. They will be designed to promote Responsible Procurement throughout the supply chain and will be consistent with commitments that CLRL has made during the development phase.

Post-contract

In order to ensure that results are achieved, any Responsible Procurement commitments made by contractors during the procurement phase will be the subject to an appropriate level of review and monitoring.

4.7.6 Contract Packaging and Logistics

Strategic approach to packaging

A Programme of the scale and complexity of Crossrail presents considerable challenges but also offers considerable opportunities for efficiency and improved value. These would come largely from economies of scale, Programme-wide collaboration and logistics, standardisation of approach and by the retention of skilled resources and successful teams over the duration of the works period. In order to maximise these potential benefits CLRL's current proposals are to procure high value works packages at a level which can be delivered and sustained by the industry.

Initial packaging proposals

An initial packaging plan has been developed and is set out in the Crossrail Delivery Strategy. This plan will need to be responsive to market conditions as the Programme develops and will need to be kept under review to take account of a range of factors that will impact on the proposed procurement strategy.

Design responsibility

In May 2006 CLRL appointed four multi-disciplinary design organisations (MDCs) to develop the scheme reference design and this design work has been largely completed. The original assumption was that all Programme requirements would be delivered through design and build contract arrangements based on the scheme reference design.

It became clear however, that for some elements of the Programme requirements the use of design and build would not be likely to offer a deliverable strategy nor offer a good value approach.

The major area of concern was the delivery of the civils infrastructure requirements where the design resource requirements of a design and build approach for both the supply side and the client, particularly during the tender phase, would be very high.

Feedback from the industry also indicated that the potential risk exposure for contractors on high value, complex contracts would mean that a design and build approach for the civils works would not be attractive to potential bidders.

An assessment of the different options for the development of the detailed design of the Crossrail requirements showed that there is no single approach which would satisfactorily deliver best value on all of the different elements of the programme. It was concluded that a variable approach will be needed which best addresses the different requirements and to make best use of the resources available within the industry.

In broad terms the approach for the main elements are as follows:

- Systems, M&E & Rolling Stock – Design and Build (and maintenance where appropriate) based on functional specifications; and
- Civil Engineering works – “Optimised Contractor Involvement” approach based on design developed by CLRL and which is reviewed and optimised by the contractor.

This approach needed the procurement of design resources to a framework arrangement which would provide the flexibility needed to deliver the optimised arrangements and to be able to accommodate change in a controlled and efficient manner.

Tenders for the Design Consultancy Framework Contracts were invited at the end of August. It is expected that the new Frameworks will be in place by late Autumn 2008.

Advance Works and Enabling Works

CLRL are currently supported by an Enabling Works Managing Agent (EWMA), Taylor Woodrow. CLRL's current Development Manager has been appointed as CLRL's client representative for this contract until such time as the Project Delivery Partner is appointed, at which time the role of client representative for the EWMA contract will pass to the Project Delivery Partner.

The EWMA's contract runs through to around the end of 2009 after which their responsibilities will pass to the Project Delivery Partner.

A number of packages of early works have been identified as being potentially critical to maintaining the overall Crossrail construction programme.

These need to be undertaken in advance of the main construction contracts. A Contract Notice for the procurement of framework contractors to deliver certain advance works has been published and Expressions of Interest are awaited. The frameworks will allow individual works contracts to be put in place quickly and efficiently.

4.7.7 Procurement of the Civils & Building Infrastructure Works

The Crossrail civil engineering and building requirements are too large to be procured as a single contract and need to be packaged in a way that ensures effective competition and makes best use of the available resources.

The packaging strategy needs to be established to be attractive to the leading UK and international contractors to help ensure a healthy level of competition. It will however, also need to be flexible to allow CLRL to react to market conditions at the time that work is put out to the market.

Packaging proposals

The preliminary contract packaging schedule is described in the Crossrail Programme Delivery Strategy and represents the baseline position and where necessary packages could be disaggregated in response to market conditions.

Optimised Contractor Involvement (OCI)

For the reasons described above, it has been decided not to use a traditional design and build approach and to adopt an Optimised Contractor Involvement (OCI) approach based on initial designs developed to an appropriate stage by the employer. The OCI approach seeks to obtain the benefits of contractor involvement in the development and finalisation of the detailed design process whilst minimising the cost of tendering and the demands on the design resources which are in short supply in the construction industry.

The particular benefits of this approach are seen as:

- Contractor input into the optimisation and finalisation of the detailed design process;
- Contractor and supply chain review of buildability;
- Reduced tendering costs;
- The contractor would be brought into the ownership of the design through the selection process and by the requirement to give early warning of problems and through the use of incentives to minimise the cost consequences; and
- Flexibility in the timing of the award of contracts to fit in with Programme gateway hold points where necessary

The approach would involve a two-stage selection process and a two-phase contract with the commitment to construction coming at the end of the first phase of the contract. The OCI approach would follow the process set out below:

- The employer completes detailed design to the extent needed for the purposes of commencing the tendering the construction contracts;
- Tenders would be invited on the basis of this design with any contractor design elements being specified but overall the design requirements during tender would be minimal;
- Following pre-qualification a two-stage selection process would be used with the first stage being a technical and quality based assessment to further reduce the number of bidders chosen to move forward to the second stage;

- The second-stage would involve the short-listed bidders carrying out an initial review and optimisation of the employer's design to achieve efficiencies and develop a value engineered solution;
- It is anticipated that it will be necessary to contribute to the development costs during this period. The bidders' approach and attitude over this period could be part of the assessment process. At the end of this stage the bidders would submit their final bids including the contract target price;
- The contract would be awarded on the basis of the most economically advantageous tender;
- The first phase of the contract would provide the opportunity for further value engineering, construction planning and mobilisation; and
- The timing of the end of the first phase can be programmed to coincide with the requirements for overall Programme reviews needed before commitment to construction is given.

Under this approach CLRL, through its design consultants, would retain overall responsibility for the design ensuring that all obligations and requirements are incorporated except for specific elements of the works which are defined as contractor designed.

4.7.8 Procurement of the Railway and Station Systems

The systems requirements for Crossrail are outlined in the Crossrail Delivery Strategy and represent a relatively small part of the overall cost but have a very different risk profile.

The execution of the Crossrail rail systems represents a significant challenge from the perspective of design, procurement and stakeholder management.

Notwithstanding the agreements reached between the Sponsors as to the division of responsibility for the delivery of Crossrail, the rail systems need to be considered 'line-wide'. To this extent they differ from CLRL's higher value civils procurements which are restricted to the Central Section.

In general, the rail systems will be procured through design and construct contracts based on performance specifications developed from the CPFR. Certain rail systems will need to be specified to a higher degree in order to manage critical interface or performance risks.

For the same reason, by exception, certain rail systems will be procured on the basis of a CLRL design.

For the station systems there will be purchasing and long-term maintenance benefits in having standardisation of equipment, components and fittings across the stations. This will be achieved by establishing programme-wide purchasing arrangements.

Schedule

The functional specifications needed for the procurement of the railway and station systems will be developed by the new Design Framework Consultants.

Whilst the systems cannot be installed until the infrastructure works have been constructed it may be desirable to have the systems contractors appointed as early as possible. This would allow the design of the civils and building works to be integrated with the design and development of the systems. Alternatively flexibility will have to be provided in the civils works to accommodate possible requirements

Dates for the procurement of railway systems installations being undertaken by Stakeholders other than CLRL have yet to be established by the agreements which are currently being drafted.

Certain on-network advanced works which are required to allow access for construction of the tunnel portals are required early in the Programme's development and special procurement arrangements will be required. These works will be implemented by Network Rail with design commissioned by CLRL.

Roles and responsibilities

By their nature a number of the rail systems will need to be designed as continuous line-wide and installed in sections of the Crossrail envelope being variously implemented by CLRL, Network Rail, the DBFO Depot contractor, Canary Wharf Group and Berkeley Homes Group.

Other systems can be independently designed and procured in each section thus allowing freedom for the Stakeholder to manage the technical, commercial and programme risk for the systems installation in their section.

In all cases CLRL will be responsible for the systems integration at section boundaries and for establishing collaborative working arrangements between the different parties.

The systems specification will also be impacted by the final arrangements agreed between the Sponsors as to operation and management. These arrangements are currently being finalised in a number of Stakeholder agreements.

Procurement

Central Section

Although the role of Network Rail is not yet fully defined it is anticipated that the procurement of the railway systems in the Central Section will be wholly under the control of CLRL. The potential exception to this approach is the Traction Power Supplies which may be implemented by Network Rail.

CLRL will have responsibility for the Programme management of the Central Section works and for the coordination of packages of work to be undertaken by specialist systems contractors. Systems procurement will reflect individual systems being implemented as a single contract in a continuous manner portal to portal.

Each individual system will either be procured as a self contained design and construct works package or bundled with other systems to exploit synergies in design or construction.

A flexible approach will be adopted for the packaging of the systems to allow the market to respond in a way that achieves best value and which best manages the interface risks.

Programme-wide purchasing arrangements will be established to achieve the benefits of standardisation and improved purchasing leverage. Responsibility for the coordination and implementation of the systems at individual stations will lie with the main station civils contractor to ensure that the interface between civils and systems is managed as effectively as possible.

Crossrail will develop the specification/design to a sufficient extent so that it can control system integration to avoid transferring systems integration risks to the contractors which would give rise to the likelihood of scope creep/variations as systems designs are integrated post contract award.

Works undertaken by other parties

A number of rail systems will interface with works being undertaken outside of the central section by other parties including Network Rail, Canary Wharf Group and Berkeley Homes. The agreements established between CLRL and these Stakeholders will establish the dates when CLRL's specifications will need to be issued.

These dates will dictate whether the rail systems design and specification needs to be advanced relative to the dates needed for the Central Section.

On-Network works

Arrangements with Network Rail are being set down in a Regulatory Protocol which will establish CLRL and NR's respective roles and responsibilities for the delivery of the works on the national rail network.

Network Rail will develop a design and establish a scope of works based on a Track Access option granted by the Regulator and a performance specification developed from the Crossrail Programme Functional Requirements.

Development of this scope will be dependant on the infrastructure in place or already in hand to suit the then current operational requirements of other TOCs operating on the Network alongside Crossrail. More detailed specifications for rail systems will be developed in conjunction with Network Rail for works such as the Automatic Train Operating (ATO) signalling system where this is to operate in parallel with their existing (or upgraded) signalling systems.

Depot and Stabling Facilities

CLRL is working with RfL, as the future operator of the railway, to develop the specification for the future depot facilities, for incorporation into the CPFR.

In view of the need to ensure full integration of critical operational systems it is currently proposed that the ATO signalling and communication systems for the depot and stabling sites would be procured as part of the packages let for the Central Section.

The depot is integral to the maintenance and commissioning of the rolling stock vehicles.

The task of developing the site is complex, given the existing contractual arrangements and operational status, and its intended use for temporary facilities during tunnel construction. It is yet to be decided whether stabling facilities (currently assumed to be located in Maidenhead, Ilford, Gidea Park and Shenfield) are to be included in this package of works or to be incorporated in Network Rail On-Network Works.

4.7.9 Procurement of Rolling Stock

The working assumption is that CLRL will be responsible for the overall management of the procurement of rolling stock for the Crossrail Programme and that CLRL will work jointly with TfL to deliver Programme requirements. The funding for procurement of rolling stock is in addition to the Sponsor Committed Funding.

Schedule

Based on CLRL's current programme, the date for issuing the ITT will be in early 2013. However, should there be a procurement requirement for new trains to replace those serving current Great Western and Great Eastern services, the ITT would need to be brought forward by nearly two years to 2011.

Specification

CLRL is responsible for translating the Sponsors' Requirements into a detailed functional specification.

CLRL will consult and agree the functional specification with TfL, as operators of the rolling stock and maintenance depot, further to reviewing the operational assumptions upon which this has been based.

This will include any commercial and technical issues which will have a significant impact on the financing, long term cost of operations and performance of the rolling stock and depots. DfT will also be consulted with respect to the specification and financing structures put forward for the Inter-City Express procurement.

CLRL will be responsible for the production and detailing of the engineering specification, based on the agreed functional specification. This will be achieved by agreeing the appropriate technical standards and associated requirements with TfL.

Procurement Strategy

CLRL will lead procurement of the rolling stock and depot but with TfL involvement. The financing and other constraints are to be agreed with the Sponsors. The rolling stock will be provided through a leasing arrangement, rather than direct ownership.

TfL will take lead responsibility, with extensive consultation with DfT and CLRL for developing the financing strategy to meet the off balance sheet requirements and value for money requirement. The procurement strategy will determine who the counterparties to the contracts will be. This could be TfL, CLRL or both parties. The options and recommendations will be presented to the CLRL Board for approval.

Procurement Process

CLRL will be responsible for the overall Programme management and delivery of the railway systems and will manage the procurement process in line with the agreed procurement strategy for the rolling stock and depots. The party responsible for leading the tender process, negotiating with the suppliers will be determined by the agreed finance and procurement strategy.

TfL and CLRL will establish the key evaluation criteria for awarding the contract based on adherence to the technical specification and providing the value for money criteria. DfT will, in addition to being informed of critical decisions made (e.g. selecting bidders for ITT, short listing bidders after tender evaluation etc.) be consulted on the form of the contract documents proposed.

Contract forms for the rolling stock supply and maintenance contracts will almost certainly be let through bespoke agreements. The form of these agreements will need to reflect any decision to bundle the rolling stock with the depot and possibly the stabling facilities and whether the procurement will be through a leasing company such as a bank or RosCo.

Programme Delivery

CLRL will be responsible for the integration of the infrastructure, components and systems comprised in the different elements of the Crossrail Programme including rolling stock and the associated train care facilities.

CLRL will manage the supply chain throughout each of the rolling stock programme phases from contract award through delivery and service introduction.

These responsibilities will include the execution of contractual obligations by all parties, as well as any approvals required from Network Rail and other operators, via the CLRL Compliance and Assurance Group (CAG) process. TfL will be responsible for ensuring that operational support is provided where appropriate, in particular driver training. TfL will also be responsible for accepting vehicles and facilities for operational service following due diligence and audit of vehicles and facilities.

4.7.10 Over Site Developments

Procurement of OSD structures will be via bespoke agreements with the selected development partners.

4.7.11 Forms of Contract

To achieve successful outcomes on the Crossrail Programme it will be necessary to adopt forms of contract that support the delivery of the Programme objectives in line with the CLRL values and desired way of working. The contract will also need to accommodate a sensible approach to risk allocation and need to be one that is capable of attracting the best major UK and International contractors.

The NEC3 contract meets these requirements, is endorsed by the Office of Government Contracts and it is now successfully used across the UK construction industry. It is anticipated therefore, that the NEC3 will be the standard form of contract to be used by CLRL on the Crossrail Programme. Final decisions will be confirmed following engagement and consultation with the industry.

Previous experience on programmes using the NEC form of contract have shown that it is very important to establish effective contract management arrangements from the outset and that all parties commit the right resources needed to the administration of the contract to achieve a successful outcome. CLRL is committed to ensuring that the appropriate contract management arrangements will be in place and that potential suppliers are aligned with the requirements and are also committed to delivering a successful outcome.

4.7.12 Insurance

Insurance requirements on a programme of the value and complexity of Crossrail will be substantial and wide ranging.

Leaving insurance to individual contractors would be likely to be inefficient, difficult to administer and would carry the risks of incomplete cover and lack of clarity on liability. It is intended therefore, to put in place comprehensive Programme insurance arrangements to provide better value for money and more efficient insurance and claims management. The insurance proposals will be developed by insurance advisers who have recently been appointed by a competitive tender process (Heath Lambert).

4.8 Logistics Strategy

4.8.1 Role, Objectives and Current Status

The role of CLRL's logistics function is to identify, consider, develop, procure, manage and maintain the Programme's logistics activities. These are activities that will allow the movement of materials, people, plant, facilities, waste and other resources to and from the Programme's construction sites, meeting the requirements of those construction sites.

Activities that could be undertaken remotely from the main construction sites (e.g. segment manufacture) may also be progressed as logistics activities. Essential to this function is ensuring delivery of the output from these activities to the right place at the right time, as often early delivery can be as detrimental as late delivery.

Responsibility for the delivery of this role will be split between levels 1 (Programme), 2 (project) and 3 (contract) of the Programme team but in order to full fill this role the logistics function will need to:

- Define the Programme Logistics Strategy (PLS);
- Develop a Detailed Logistics Plan (DLP) for each project;
- Implement and co-ordinate the detailed logistics plans across the work packages within each project,
- Co-ordinate the detailed logistics plans across each project; and
- Ensure and demonstrate compliance with all of the above.

The levels at which this process will be delivered is summarised in figure 4.8.1 and described in further detail below.

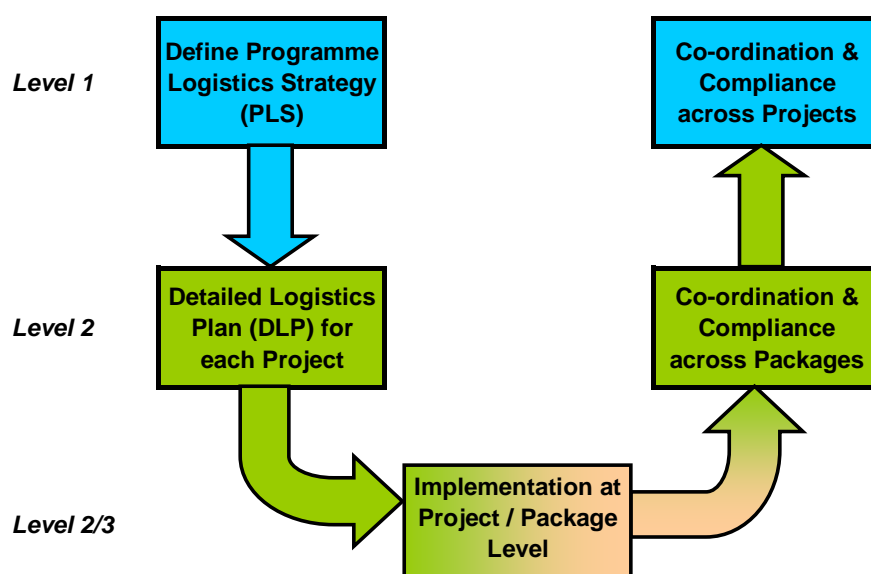


Figure 4.8.1 – Logistics Process

**Define Logistics Strategy
(Programme – Level 1)**

- Define the Programme Logistics Strategy (PLS) within which all projects must operate.
- Set the Programme wide standard for all projects, defining the objectives and constraints that must be met.
- Constraints particular to a specific sub-project may also be set.
- Approve the detailed logistics delivery plan produced at level 2.

**Detailed Logistics Plan for Projects
(Project – Level 2)**

- Produce the DLP for each project detailing addressing geographic specific risks, constraints, solutions and implementation strategies.
- Approve the site-specific logistics delivery plan produced at level 3 in so far as it impacts on the project logistics delivery plan.

**Implementation
(Project/Work Package – Level 2/3)**

- Implementation of the project DLP including the management and operation of logistics contracts and activities.

**Co-ordination & Compliance across Work Packages
(Project – Level 2)**

- Co-ordination of logistics activities across all work packages to ensure and demonstrate that they are implemented with the DLP for that project and comply with the PLS.

**Co-ordination & Compliance across Projects
(Programme Management – Level 1)**

- Co-ordination of all project DLP plans to ensure and demonstrate overall compliance of the sum of all projects with the PLS.
- The strategy must:
 - Comply with existing legislation including the Crossrail Act;
 - Comply with the Environmental Minimum Requirements and the Register of Undertakings and Assurances; and

- Promote sustainable construction.

The activities that will form part of the logistics strategy will be defined as the Crossrail develops, but the main activities identified to date are:

- Excavated Material & Construction/ Demolition arisings - The disposal and/or recycling of excavated material and construction/demolition arisings to a suitable point of deposition;
- Consolidation centres - Management of locations dedicated to the receipt and onward delivery of materials and other resources/waste;
- Modular design and off-site manufacture - Design and manufacture of modular elements that can be undertaken outside construction sites (e.g. tunnel segments);
- Concrete batching and supply - The supply of concrete to construction sites including the consideration of dedicated batching plants and supply of raw materials to those batching plants;
- Materials/resources supply - The supply of materials to construction sites, via consolidation centres where applicable;
- Logistics "Control Tower";
- Transportation management - The movement of excavated material, waste, goods, materials, supplies and plant by road, rail or water, into & out of construction sites and consolidation centres. This includes the movement of emergency vehicles;
- Security - The security of all logistics activities and their interface with other elements of the Programme including the consideration of strategic security items across all construction sites;
- Facilities and set-up - The provision of site set-up, welfare, hoardings and utility services to all construction sites; and
- Waste management - The disposal and recycling of normal construction waste.

The main objectives of the logistics function are detailed in table 4.8.2 below. These are the strategic objectives that will apply in varying degrees to all projects and the logistics activities defined above.

One of the key roles of CLRL's logistics strategy is to integrate the above activities to ensure there is a cross-Programme solution that meets the Programme's requirements.

To this end a CLRL Construction Logistics Strategy has been produced which identifies the current status of logistics and recommends further development.

This document details the constraints, issues and criticalities of logistics activities. It will form the basis for the next stage of work and development of the logistics strategy which will be developed in two parts as described below.

4.8.2 Initial Strategy

CLRL's short term objective is to produce an integrated logistics strategy that meets the current Programme requirements and complies with the Crossrail Programme.

The objective for this strategy is that it will be flexible enough to adapt to change as Crossrail develops. In addition, Programme critical activities will be identified and developed in detail to safeguard the Programme schedule.

For example the final location for excavated material and waste should be identified and secured so that this significant Programme risk can be minimised.

Through this initial strategy CLRL will seek to:

- Develop the overall logistics strategy for all work streams;
- Produce a logistics schedule as part of Crossrail's master schedule, including consents;
- Identify critical activities from that schedule and develop further detail for these activities;
- Undertake an integrated feasibility study to cover:
 - excavated material and waste;
 - logistics "control tower", consolidation centres and transportation management;
 - concrete and materials deliveries;
 - transport to and from project sites; and
 - land required for logistics activities;
- Secure options for the disposal of excavated material;
- Develop a materials efficiency and waste management strategy;
- Develop a logistics procurement strategy;
- Develop relationships with Local Authorities and other approval bodies; and
- Identify logistics risks and implement management action plans.

Objective	Description
Health & Safety	To deliver excellence in health and safety for: <ul style="list-style-type: none"> those engaged directly in logistics activities; the public that may be affected by logistics activities; suppliers and contractors that either receive or provide; and services from or to the logistics function.
Environmental Impact	To minimise the environmental impact of logistics activities and/or to develop logistics activities such that the environmental impact of the whole Programme is minimised. A specific objective being to implement a strategy that ensures London does not cease to operate as a result of Programme activities.
Programme Schedule and Cost	To ensure resources (materials, concrete, waste, excavated material, etc) are delivered to or removed from the right place, at the right time, for the right cost.
Sustainability	To ensure sustainability is given due importance as a criteria when determining strategy. In particular promoting sustainability when considering material/resources suppliers and waste/excavated material disposal.
Security	To determine the appropriate level of security for the various logistics activities and to develop and implement a strategy that provides that level. This will consider the security of resources and materials from point of source to point of delivery.
Communication and Consultation	To deliver effective communication of logistics activities during the consents and implementation phases to interested and affected third parties/suppliers/contractors to ensure there is confidence that the Programme will meet its objectives and can deal with the unforeseen.
Consents	To schedule, obtain consent and approval for logistics activities, with particular attention on any issues that may be outside Act powers (e.g. consolidation centres).
Co-ordination and Control	To co-ordinate and control all logistics activities Programme-wide to ensure implementation of all activities meets all the objectives.
Risk and Contingency Planning	To identify risks and propose and implement mitigation. A key focus being to ensure that there are contingencies in place to respond to incidents during the implementation phase.
Compliance	To ensure compliance with the Logistics Strategy and objectives irrespective of who implements the strategy on a day-to-day basis.

Figure 4.8.2 – Logistic Objectives

4.8.3 Long Term Strategy

CLRL's long term objective is to develop the Logistics Strategy into detailed elements that can be implemented to support the start of enabling works and main construction, and to operate and maintain that strategy. Key early activities are considered to be:

- Integration of the logistics function with the appointed Programme Partner;
- Production of detailed strategies for all logistics activities at a project level;
- Input as required to the enabling works and main construction contracts and programmes;
- Implementation of the logistics procurement strategy;
- Obtaining consents from third parties for logistic activities; and
- Acquisition of land, particularly that outside LOD's/LLAU.

4.9 Operations Strategy

4.9.1 Training (Operations and Maintenance)

The purpose of the training programme will be to ensure that all staff are prepared and ready to assume their duties in a professional and safe manner on the opening of the Crossrail system.

The Crossrail railway will contain many unique features and it is well understood that the training will need to look holistically as well as detailing each system/process.

A simulation of the tunnel/rolling stock/cross passage/command and control/stations and driver simulator has been specified in the CPFR at Old Oak Common. This will serve also as a back up command and control centre in the event of the normal facilities being unavailable.

CLRL will carry out a full task analysis in order to devise training programmes for those requiring knowledge or conversion training. Based on this information, training programmes will be devised which will also highlight particular processes that require special attention, either through safety requirements or because of an identified complication.

Assessment criteria will need to be produced to ensure proofs of competencies are available.

Training will be based, as far as possible, on using live or simulated equipment. This will be particularly important for emergency situations which require on-going drills and several full practical exercises pre-opening in conjunction with emergency services in order to practise the organisational response.

The need for joint training will need to be recognised. It has been accepted that LUL staff will be trained to understand Crossrail infrastructure and station rules and vice versa so that staff on stations can pool resources in times when an urgent response is required.

4.9.2 Trial Operation

The process leading to completion

'Overall Completion' by CLRL of the entire works, as required to satisfy the Sponsors' Requirements, will include asset testing, handover, dynamic trials and completion.

Subsequent stages of trial operations and passenger revenue services will be the accountability of the Infrastructure Managers and Operators and are shown in Figure 4.9.2.1:

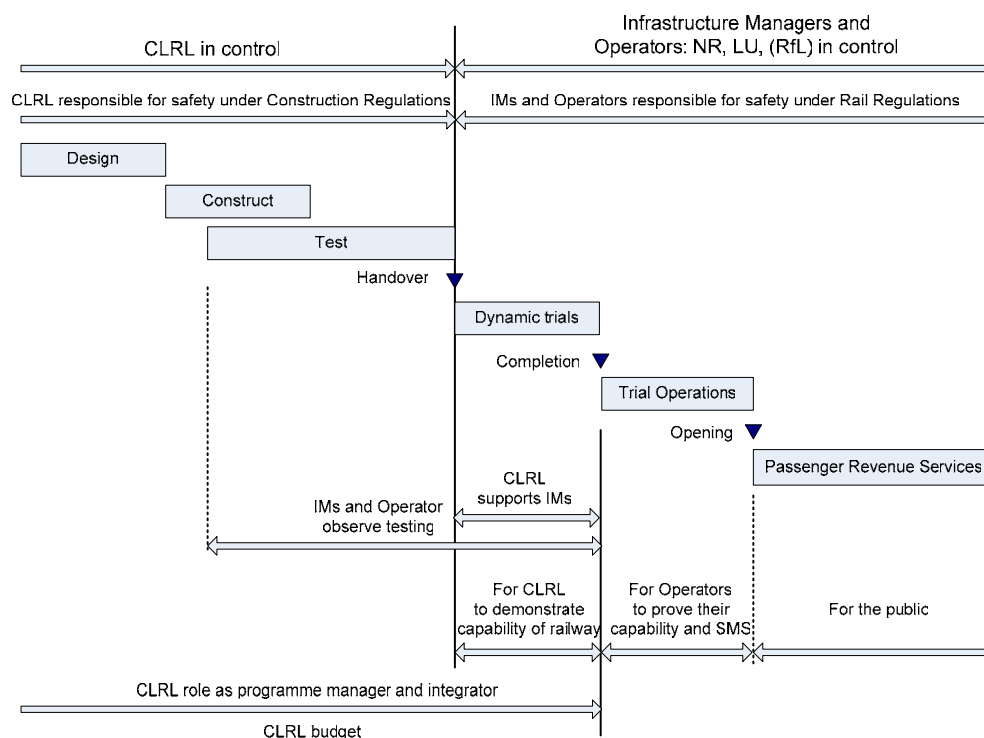


Figure 4.9.2.1 – Responsibilities Leading up to Project Handover

Testing

CLRL will define and control tests to demonstrate readiness for handover and physical completion. The tests will prove each element and that they work together in an integrated manner in accordance with the CPFR. The Infrastructure Managers and Operators will observe these tests to progressively build their understanding of what is being delivered.

Dynamic trials

Functionality can only be demonstrated in dynamic conditions. For example:

- The performance of rolling stock and infrastructure working together;
- The handover of train control from one signalling system to another; and
- The performance of the ventilation system when trains are operating.

These trials will be designed by CLRL and operated by the Infrastructure Managers.

CLRL will assure the Sponsors, Infrastructure Managers and Operators that together the testing and dynamic trials are sufficient to demonstrate that the CPFR has been satisfied.

Handover

Prior to those dynamic trials, there will be a progressive handover of elements of the works to the Infrastructure Managers and Operators:

- Handover of the stations to each station Infrastructure Manager (LU, RfL, NR and TOCs');
- Handover of the railway system, including the tunnel systems in the Central Section works, to the railway system Infrastructure Manager, NR;
- Handover of the rolling stock to the future Operator; and
- Handover to either the Infrastructure manager or the Rolling Stock provider of the train care facilities (as appropriate).

At handover CLRL will issue to the recipient the documentation required to support future operation, maintenance and renewal of the assets concerned.

Following handover, responsibility for safe usage, maintenance and renewal of the element concerned will pass to the receiving party.

Completion

Completion includes:

- Completion by CLRL of the Central Section, including:
 - completion by LU of their elements of the LU interface works;

- completion of any DLR related works;
 - completion by CWG of Isle of Dogs Station; and
 - completion by Berkeley Homes of Woolwich Station Box (and to the extent agreed, Woolwich Station fit-out).
- Completion by NR of the On Network Works;
 - Completion of the rolling stock and the depot;
 - Completion of system-wide systems (e.g. signalling and traction control); and
 - Completion of the works sufficient to enable OSD.

Each of these completions will be demonstrated through test reports and other documentation subject to the provisions of any third party agreements.

In accordance with its terms of reference, the Compliance and Assurance Group (CAG) will assure the Sponsors, Infrastructure Managers and Operators that the standards applying to the Programme have been satisfied.

Where completions are planned in advance of handover to Infrastructure Managers, CLRL's Shadow Operator will review the relevant aspects of the works on their behalf. The future Infrastructure Managers will, however, be involved as observers throughout the process.

Trial operations

Also, following handover and completion, RfL (or its franchisee) will plan and execute trials to demonstrate that the Infrastructure Managers and Operators are capable of operating the railway in accordance with their Safety Management Systems.

Defect rectification

CLRL shall retain the accountability for correcting any agreed defects at each completion. CLRL will utilise the provisions of its delivery contracts and the agreements with Industry Partners to rectify defects efficiently and at the earliest opportunity.

4.9.3 Safety and Security Management System

The ultimate Train and Station Operating Company will need to have a Safety Management System in place that meets the requirements (amongst other current safety legislation) of the Railway and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS) in order to operate.

This Safety Management System must detail how safety is managed and delivered for the elements of operation that the company is directly responsible for. It must importantly also detail how the company will interface with other railway organisations in day to day operation so that safety is established as part of an overall system.

In performing its role as 'shadow train operating company', CLRL's Railway Services team will effectively be involved (through the specification of the Crossrail design and the number of people required to operate it) in setting up a new railway train operating company.

Therefore a 2007/08 Railway Services Safety Management System has been introduced which starts to implement ROGS in proportion to the current stage of Crossrail development.

In addition, since safety and security activities are often dovetailed, the Safety Management System will also detail how security is managed by the train and station operating company.

This current Safety Management System begins to implement the legislative requirements for the creation of a Crossrail Train Operating Company and provides the framework for the further development of the 2017 Safety Management System.

Whilst it is recognised that the final Operator will have its own arrangements in place, the development of a Safety Management System now permits:

- Discipline of process – permitting safety to play its part as a business cornerstone;
- Commonality of purpose and process in discussions with Network Rail and London Underground;
- Confidence that application for safety permissions would be successful;
- Creation of the detailed design and detailed design interfaces;
- A Safety Management System for testing and commissioning work;
- Satisfies external stakeholders (e.g. ORR/ HMRI) of our process;
- Identifies safety management areas that will be bespoke to Crossrail, thus needing to be integrated into the safety management system of the eventual operating company;
- Permits the operation of Crossrail to be play-tested.
- In summary the Railway Services Safety Management System explains how 'operational railway' safety risk is controlled during design in the current stage of the project, and implements the framework for how the 2017 railway will likely operate.

Implementing ROGS methods in 'shadow operation' permits the Programme to construct its railway safety management system using processes familiar to other railway organisations and rail safety authorities at the same time proving that required permissions can be gained. The aim is to define how the railway will actually work – how it will feel and what it will look like, allowing the Railway Services team to be proactive in the systems operation.

4.10 Human Resources

4.10.1 Programme Resources and Organisation

As a result of pressures on skills and resources there are many activities already in place to increase the supply of skilled people to meet forecasted demands. In particular CLRL will:

- Together with our business partners, introduce a CLRL Professional Development scheme aimed at those qualified to degree level to develop further their specialist skills in a variety of disciplines including civil, mechanical, and electronic and systems engineering that will be needed for the Programme to succeed.

These schemes aim at providing participants with work based training providing a practical basis for the application of their knowledge. These trainees contribute strongly to the organisation as early as three months from the start of their training and on completion of their two year training scheme can expect permanent employment with either CLRL or one of its contractors.

All training schemes are Monitored Professional Development Schemes accredited with the appropriate professional institute and cover all the elements of the criteria set by these institutes;

- Offer, in addition to these formal schemes, a number of secondment and experience opportunities for students currently at university with the aim of encouraging interest in the Programme and to become possible future employees;
- In partnership with others, create a tunnelling skills academy that will provide specific tunnelling skills for those from the local population who wish to pursue a career in construction, providing them with the skills, knowledge and experience to be able to first work directly on the Programme and subsequently have high level skills they can use throughout their working lives to provide them with secure and skilled employment;

- Develop a specific training scheme that will change the way individuals are qualified to Engineering Technician level by offering a modular approach to qualification that will synchronise with the skills needs of the Programme as it progresses and provide participants with progressive qualification to technician level whilst utilising the participant's skills in the Programme;
- In addition, develop an apprenticeship scheme which will target individuals with an interest in construction but without the necessary academic qualifications to enter the profession at a Technician level. The scheme will offer practical training theoretically underpinned allowing participants to gain vocational qualifications;
- Work with its contractors to ensure that local communities are able to access training and employment opportunities in order to update their skills and gain maximum benefits from the work in their area. Involving members of the local community in the construction of the line will also assist CLRL in expanding its supply of potential labour; and
- Aim to increase its involvement in coaching and training initiatives as the Programme develops.

CLRL is already:

- Working with local schools, colleges and universities with the aim of increasing the awareness amongst young people of the career opportunities available in construction and engineering. In order to help achieve this aim, CLRL is working with Diploma Partnerships to support and promote the new Diplomas in Construction and the Built Environment and Engineering;
- Running a "Young Crossrail" initiative which targets school students, providing information and activities supported by senior CLRL staff.

Furthermore, CLRL has launched its third curriculum programme for 'Gifted and Talented students' at schools along the new railway route as part of its Young Crossrail Education Programme.

Teams of students from six secondary schools have been set the challenge of preparing a strategy for the construction phase of a hypothetical new railway to be built between London and Cambridge. In this way CLRL aims to build interest at a community level and

- Involved in the Construction Skills coaching programme working directly with school students coaching them in construction principles.

4.10.2 Policies

CLRL employment policies summarise CLRL's responsibility to individuals and their responsibility to CLRL. In addition the policies and procedures are designed to recognise diversity, eliminate discrimination and adhere to and promote CLRL's values.

The policies are published on CLRL's internal Business Management System and as such are readily accessible to all CLRL staff. An induction process is used to communicate key policies and encourages staff to consider the contents carefully.

Recommendation to amend, create or withdraw policy documents are submitted to an Employment Policy Review Group within CLRL which acts as an advisory body to CLRL's Executive Board. Its role is to advise and make recommendations to CLRL's Executive Board on any changes.

As part of CLRL's commitment to promote equality and diversity in the workplace, CLRL monitor its workforce profile against relevant demographic profiles. Given the location of the Crossrail route our benchmark data is based on the demographics of both London and South East as this is the population CLRL intend to serve and potentially employ from.

The benchmark data is derived from the Labour Force Survey 2005; specifically economically active people (as defined by the International Labour Organisation) in London and the South East.

4.10.3 Supply and Demand

The latest labour predictions of labour demand for Crossrail indicate that the peak workforce will be in the order of over 14,000 in the fifth year of main construction 2015. Labour requirements for the construction of Crossrail are estimated at 65,000 employment-years.

The number of workers required over the life of the Programme is expected to be in the order of five to ten times the peak requirement. This would equate to 70,000 to 140,000 workers being required over the life of the Programme. (Note: Terminal 5 at Heathrow had a peak labour force of 8,000 with 60,000 individuals being employed on the project.)

The Construction Skills Network (CSN) has produced forecasts for the demand of labour and skills on a UK wide and a regional basis. The latest reports are available at www.constructionskills.net. CSN predicts that nationally construction labour demands peak in 2011 and that growth will then slow.

Nationally, CSN predict that 88,400 new workers will need to be recruited into the construction industry each year. In the Greater London area, CSN considered a base without Crossrail and then considered Crossrail sensitivity.

For the base CSN predict that 14,930 new workers will be required each year and this rises to a range of 17,300 to 20,500 when Crossrail is included.

As well as the general background of construction in the London area, there are a number of other major projects being constructed over the same time frame. These projects include the Olympics, Thameslink, Thames Gateway, M25 road widening, Thames Tideway tunnel, BAA projects at Heathrow and Stansted and the LUL PPP schemes. Clearly these projects put greater demand on what is already a scarce resource.

The Programme approach on local labour has been considered and is presented in Information Paper D16, Use of Local Labour, and additionally undertakings have been given to local authorities on means to encourage local labour. However, it is likely that a substantial proportion of the labour will also come from outside the local area, both from within the UK and abroad.

The attraction and retention of labour will be a key issue for the programme. Crossrail needs to be seen as a programme of choice to attract the large workforce required for construction. The use of a central point of contact for job seekers linked to the Crossrail brand will assist in promoting employment opportunities. The support of the key suppliers in this process will be essential. Procurement will need to have regard to equalities issues particularly in areas with high minority ethnic populations and high unemployment.

The principle of respect for people throughout the Crossrail Programme should provide a culture which will encourage workers to stay on the Programme. Crossrail should recognise that client leadership is vital in delivering the principles of respect for people.

A workforce which is treated with respect delivers benefits to the overall construction process, including improved health and safety and less incidents on site, which leads to wider benefits to the local area. The provision of good welfare facilities and occupational health services will support the retention of labour.

4.10.4 Training and Development

In order to achieve the Sponsors' goals, Crossrail needs highly capable individuals at its core. To ensure this level of capability, CLRL has developed a range of tools aimed at supporting staff in developing their personal and technical skills and capabilities. These address:

- Technical skills identification during the job specification process and the subsequent monitoring of skill levels against that specification;
- Statutory accreditations and re-accreditations monitoring;
- IT software training and conceptual skills development;

- The identification of training and development needs required to achieve annual goals through CLRL's Delivering Performance process;
- Capability analysis to ensure that the training and development needs are identified and delivered;
- T&D facilitated team analysis;
- Personal development planning; and
- Staff development including on and off the job training, one to one or group coaching, mentoring, job shadowing, programme work, team development and facilitation, secondments, visits to external organisations, self learning, links to business libraries and personal private study towards a qualification.

4.10.5 Industrial Relations

It is recognised, on a programme of the size and complexity of Crossrail, that good industrial relations will be critical to its successful completion on time and budget. The Programme will bring together large numbers of people from many sources, with a wide range of skills and experience. It is vital that they work together effectively in a constructive and disciplined manner and a well structured framework for the conduct of Industrial Relations, based on agreed principles, will help to achieve this.

CLRL's Industrial Relations strategy embraces the principle of working in partnership with contractors and the trade unions to promote high employment standards whilst delivering the rolling stock, stations and facilities and the infrastructure of Crossrail on time and on budget.

Together with its contractors, CLRL will build on employee relations best practice to deliver a committed workforce that is motivated to work to build a world class, affordable railway delivered through effective partnerships Programme and project excellence.

CLRL has already commenced discussions with the principal Trade Unions in the Construction Industry to determine how to ensure local labour is included in the Programme where appropriate and early dialogue will commence to agree industrial relations principles and put in place a Memorandum of Agreement between the parties, following the appointment of the Programme and Project Delivery Partners.

4.11 Land Requirements

4.11.1 Land Acquisition

The land and property interests required for the construction of Crossrail will be acquired using the powers provided by the Crossrail Act for compulsory purchase and extinguishment of freehold and leasehold interests. The Act grants those powers to the Secretary of State as the acquiring authority.

CLRL will manage the acquisition process as agent for the acquiring authority in whom legal title will vest upon acquisition of the land or other interest.

This appointment will be set out in an agency agreement between CLRL and the acquiring authority which will contain the parameters within which CLRL will work.

Certain land is identified in the Act for temporary occupation. The Act makes various supplementary provisions relating to the occupation of land and the extinguishment of rights, the most significant of which is the creation of subsurface rights for the construction of tunnels.

Property related transactions and all steps related to the occupation and compulsory acquisition of land will require the approval of the CLRL Board, subject to any scheme of delegation that it establishes. The current estimate is that in excess of 13,000 interests will be affected by the powers, about a third of which might be able to claim compensation.

Within this, a significant group will be affected by subsurface acquisition which is expected to be settled by a single lump sum payment following issue of a General Vesting Declaration. Most of the compensation cost will arise from about ten buildings in Central London that are required for, or affected by, the construction of the stations.

The SoS will transfer her interest in land and property acquired by the exercise of the powers to CLRL by a transfer scheme under the provisions of the Act, with the exception of those interests which relate to over site development which will be transferred directly to TfL or a TfL subsidiary. On completion of the Programme the land and property will be disposed of in accordance with the requirements at that time.

4.11.2 Compulsory Purchase

The compulsory purchase process requires identification of all interests in land to be acquired or used. The Crossrail Act requires a minimum of 3 months notice of entry by either the issue of a Notice to Treat and Notice of Entry or by making a General Vesting Declaration.

The identification of the interests affected and subsequent service of notices will be undertaken by specialist land referencing surveyors who have already been appointed.

Entry to land can be taken to programme requirements as it is not necessary to agree compensation to obtain possession. Possession can be taken once a Period of Notice has expired irrespective of whether compensation has been agreed or not.

Regular communication meetings with affected owners and occupiers will be held up to the date of entry to facilitate the process and minimise the use of force.

The SoS has undertaken to assist businesses that will lose their premises by providing a relocation service that can give information about the availability of alternative sites.

Compensation will be payable under a range of headings arising from the entry to land together with the construction and operation of the railway. These will be determined in accordance with the relevant statutory and case law (collectively called the national compensation code).

Disputes about the level of compensation payable will be determined by the Lands Tribunal with the possibility of appeal to the courts on points of law. CLRL will be responsible for managing these processes. TfL Group Property and Facilities will provide compensation case management services to negotiate individual settlements.

4.11.3 Entry to Land

The first parcels of land required are at the Isle of Dogs and Tottenham Court Road station sites. Entry Notices will be issued as soon as possible. Preparations have started assuming that compulsory purchase notices will be issued in October 2008. This will be followed by a rolling programme aligned to the Programme delivery requirements that will complete the issue of all Notices to Treat and General Vesting Declarations within the five year time limit contained in the Crossrail Act.

It is likely that owners of interests subject to the powers will seek to negotiate disposal of their interest before either the issue or the expiry of the statutory notice.

In addition to land and property acquired by the exercise of the powers in the Act, the Secretary of State has established a Hardship Policy which is administered by CLRL for the protection of individuals and small businesses who can demonstrate that they have, or will, suffer hardship as a consequence of the Programme but not be able to claim statutory compensation.

4.12 Corporate Affairs

4.12.1 Communications

CLRL will be responsible for the management and delivery of the company's internal and external communication programme throughout all levels and stages of Crossrail, and will work closely with the Programme and Project Delivery Partners to co-ordinate the communications needs and resources across the various stages of the procurement and construction phases, to ensure that there is conformity in the messages that are communicated to staff, stakeholders and the wider public audience.

CLRL will work closely with the Programme Partner to ensure consistency in all communications.

CLRL will be responsible for announcing the award of all tenders and for agreeing all related comments or statements made by successful bidders. Such statements shall be jointly signed by both parties.

4.12.2 Media Activities

CLRL Corporate Affairs will be the main point of contact for all dealings with the media, print, broadcast and web, and proactively develop detailed 'PR Lines to Take' in preparation for responses to enquiries. To ensure consistency of approach, these will be agreed and exchanged on a regular basis with TfL, DfT, GLA and the Programme and Project Delivery Partners.

CLRL will manage briefings and maintain contact with technical, regional and national media. This will include proactively pitching articles at appropriate milestones in the programme.

CLRL will be responsible for identifying suitable Programme spokespersons from within CLRL and the Programme and Project Delivery Partners and provide appropriate media training.

4.12.3 Stakeholder activity

CLRL will conduct regular briefing meetings with existing external groups and individual stakeholders, professional institutions, railway industry, engineering consultants and contractors, and over-site developers, to enhance existing relationships.

This will include identifying and establishing new stakeholder groups across the route, including local authorities, and residents associations, identify key influencers and community leaders and brief on a regular basis.

CLRL will develop and maintain a detailed Community Relations Strategy Framework in conjunction with the Programme and Project Delivery Partners to fully engage with all affected communities.

CLRL will establish a programme of regular public and other meetings with local liaison groups, residents associations and community groups when and where appropriate in cooperation with the Programme and Project Delivery Partners and contractors with the aim of cascading up to date information and positive messages about the programme.

CLRL will maintain close working relationships with equivalent staff of DfT, TfL, NR, LUL, GLA, and the Mayor's office in conjunction with the Programme and Project Delivery Partners.

4.12.4 Public Helpdesk

CLRL will be responsible for the maintenance of the Crossrail Public Helpdesk as the first point of contact for all enquiries from the public. This will be carried out in close collaboration with the Programme and Project Delivery Partners to ensure the collation and speedy delivery, of fully informed responses.

CLRL will maintain close liaison with counterparts in TfL to ensure that there is a two-way flow of information on all public queries about the surface impacts of the programme and its overall impact on London Review and strengthen existing incident response procedures in cooperation with the Programme and Project Delivery Partners to reflect the requirements of the construction phase.

4.13 Audit

CLRL currently has the following audit and assurance functions:

Statutory External Audit

As a limited company, CLRL's Audit Committee will appoint an external auditor to carry out the financial audit, agree the Annual Report and financial statements, and report to the CLRL Board. This is currently (2007/8 year end) Deloitte, but for 2008/9 this will be the TfL auditor.

Management System Audits

These will be managed by an internal CLRL team and reporting to the CLRL Executive Board on external suppliers, internal departments and processes/business management procedures to support CLRL's ISO 9001 registration.

Internal CLRL Audits

Carried out by TfL Internal Audit, reporting to the CLRL Board Audit Committee and the TfL Board – and providing assurance to those Boards on all matters relating to CLRL and the Programme – particularly governance, risk management, fraud, controls on all process but particularly financial - and procedures and reporting.

Other Audits

CLRL and the Programme will also prepare for the following to be added:

- *The Audit Commission* – as auditors to TfL; and
- *The National Audit Office* – as auditors to the DfT and on the basis of the size of the Programme and value for money to the public purse.

In addition there will be independent oversight from the Mayor of London, MPRG, the Sponsors' independent technical adviser and DfT's Crossrail Programme representative.

5.0 Integrated Delivery Team

This section provides Tenderers with an introduction as to how CLRL are proposing to organise the Programme and Central Section Project delivery teams and what primary functions would be conducted and by whom. This information is provided for guidance purposes only.

5.1 Introduction

5.1.1 The overall Programme of work will be engineered, procured and constructed as a series of projects by CLRL and its industry partners and the Programme will therefore need to be managed at a number of levels including with and between Sponsors, at a Programme level, at a project level and at a contract level.

5.1.2 Within CLRL's overarching obligations described in Section 4, CLRL's primary roles on Crossrail will be to:

- Interpret the Sponsors' Requirements and the CPFR and to translate them into the scope of the works (including the operational/end user requirements);
- Enter into agreements with Network Rail and London Underground Limited and such other third party agreements as are necessary to deliver the Programme;
- Comply with the planning and legal structures under which the Programme is developed and delivered, including the Crossrail Act;
- Define the health and safety, environmental and quality regime under which the Programme will operate and ensure compliance;
- Set up Programme level governance and the framework to achieve compliance;
- Establish the framework for Sponsor interaction, liaison and reporting;
- Manage finance and funding;
- Define the Programme framework within which the Programme and Project Delivery Partners, designers and contractors will work;
- Establish and comply with a responsible procurement policy consistent with TfL's policies;
- Define the methodology through which third parties are procured;
- Manage the interface with Stakeholders and third parties who have an input into the Programme or some level of control over how the Programme is implemented;
- Set Programme milestones and budgets & to manage cost / payments;
- Deliver the Programme of works to schedule, managing the timing and sequence of all delivery activities to achieve a coordinated Programme;
- Integrate systems, ensuring that the interface between all systems comprising Crossrail are identified and managed to give an integrated transportation system;
- Deliver a fully tested and integrated railway system capable of supporting trial operations and IMS across the Programme;
- Establish and manage Programme wide public relations, community consultation and communications; and

- Ascertain the optimal insurance programme for the Programme, taking into account interfacing insurance programmes and the scope for self insurance and implement Programme insurance accordingly.

Programme Partner

- 5.1.3 CLRL is seeking a Programme Partner to assist in the delivery of Crossrail at three of these levels (Programme, Central Section Project and contract). The broad strategic framework under which CLRL will deliver Crossrail is shown in Figure 5.1.1.

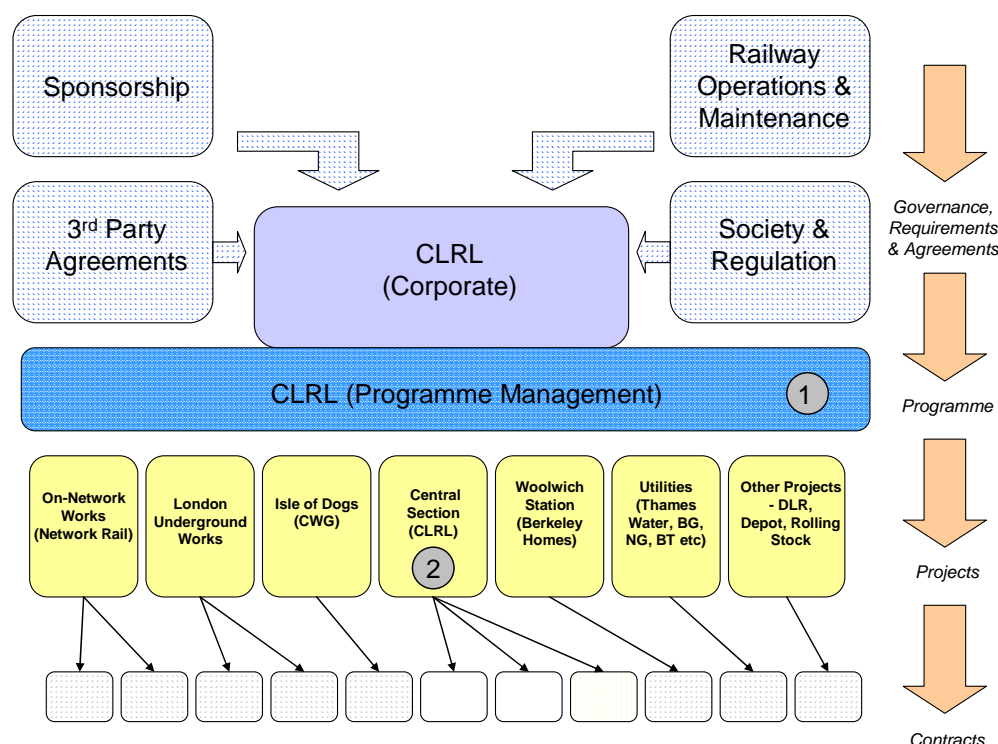
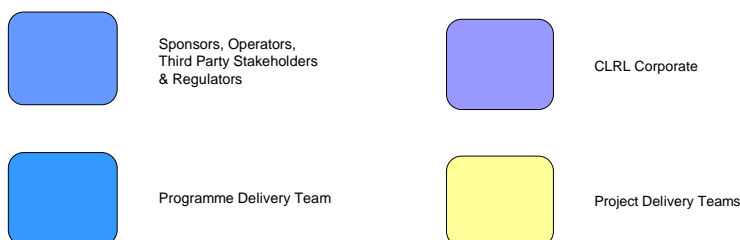


Figure 5.1.1 - Crossrail Strategic Framework



- 5.1.4 CLRL is seeking a Programme Partner to work with CLRL in order to fulfil its obligations under the enabling legislation to safely deliver the overall Programme, to time, to the desired quality and within the forecast outturn cost. The position of the role is shown organisationally by point 1 in Figure 5.1.1.

- 5.1.5 The Programme Partner will provide the CLRL client team with a professional programme, project and engineering management service and will work as part of a single integrated Programme management team led by CLRL.
- 5.1.6 The Programme Partner will work alongside CLRL staff and other CLRL consultants, to oversee and manage the delivery of Crossrail at a Programme level. The Programme Partner will be co-located in CLRL's offices.
- 5.1.7 It is not CLRL's intention to ask either the Programme or Project Delivery Partner to undertake engineering design or construction. Contracts for design, construction and commissioning will be with CLRL.
- 5.1.8 The role of the integrated Programme team is described in Appendix A and an indication of the resources that the Programme Partner will contribute towards this team is given in Appendix C.

Project Delivery Partner

- 5.1.9 As part of a separate procurement CLRL is also seeking a Project Delivery Partner to be responsible, on a day-to-day basis, for the delivery of the Central Section Project and its constituent contracts, to time, to the desired quality and within the forecast outturn cost, while fulfilling its obligations under the enabling legislation. The position of the role is shown organisationally by point 2 in Figure 5.1.1.
- 5.1.10 The role of the Central Section team is described in Appendix B and an indication of the resources that the Project Delivery Partner will contribute towards this team is given in Appendix D.

5.2 Delivery Organisation

- 5.2.1 The proposed organisation for the delivery phase of Crossrail will need to be flexible and will evolve over time based on the requirements of the Programme, Sponsor and Stakeholder agreements, as well as the resources available within CLRL and their detailed roles and responsibilities. Within the proposed organisation, overall Programme management will remain with CLRL, assisted by a fully integrated Programme Partner.
- 5.2.2 At a Central Section Project level, day to day responsibility for delivery will be passed over to the Project Delivery Partner, who will report to CLRL's Programme Implementation Director and who will lead an integrated delivery team made up of CLRL Corporate, Programme and Project staff and supply chain partners for design, construction and implementation
- 5.2.3 CLRL will provide Central Section Project sponsor oversight through a team of locally focused package sponsors reporting through a management chain to CLRL's Programme Implementation Director.
- 5.2.4 Figure 5.2.1 illustrates how CLRL is currently organised at the corporate and Programme level to oversee the various projects making up the CLRL Programme. The hatched Programme team indicates a combined CLRL/Programme Partner team.

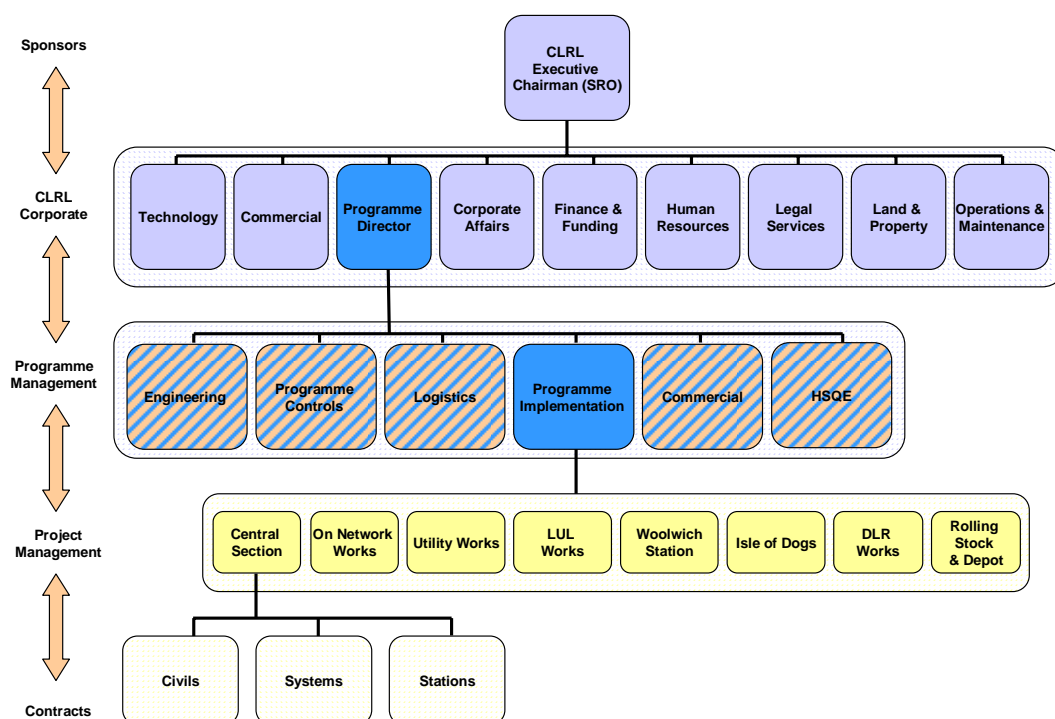
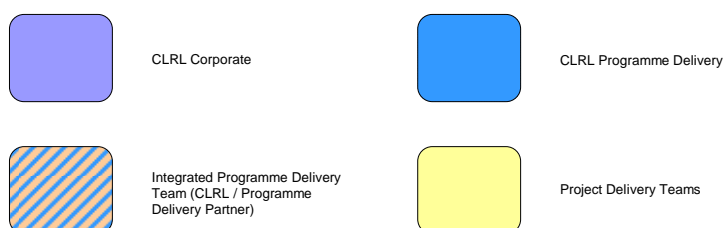


Figure 5.2.1
Proposed Programme Organisation
During Delivery Phase (Post Royal Assent)



5.2.5 The Programme team will need to:

- integrate personnel from CLRL and the Programme Partner into one high performing team;
- manage multiple project delivery teams and other delivery agents involved in both design and construction;
- deliver projects and contracts in multiple locations, timeframes, and under different contractual regimes;
- programme manage all aspects of procurement, commissioning, and operational interfaces;
- deliver on scope, cost and schedule objectives;
- meet the strategic and tactical outcomes desired by the Sponsors;
- have transparent and real time reporting on progress and challenges; and
- be able to provide the flexible resource levels needed to deliver the different phases of the Programme.

5.2.6 Figure 5.2.2 illustrates CLRL's proposed organisation for the management and delivery the Central Section Project within the Crossrail Programme.

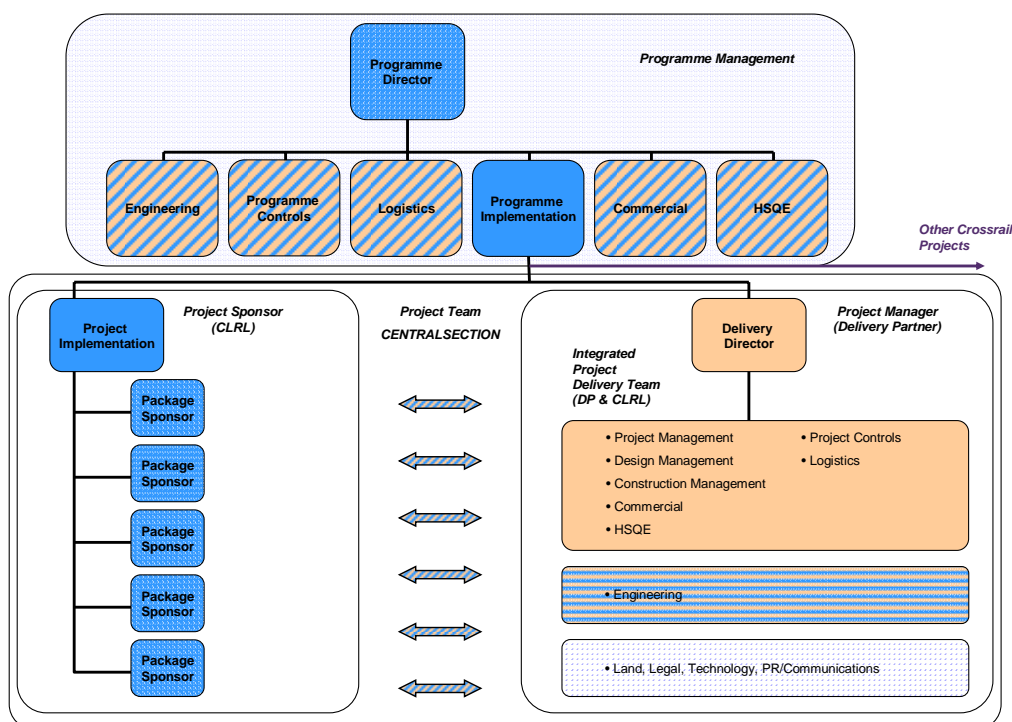
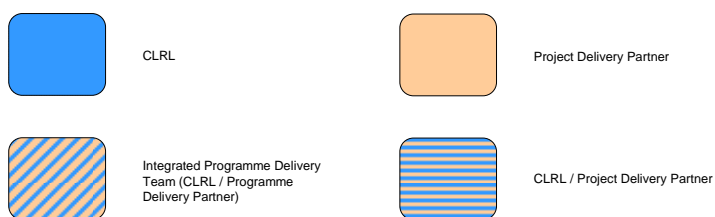


Figure 5.2.2
Central Section
Proposed Project Organisation
During Delivery Phase (Post Royal Assent)



5.2.7 In undertaking their role, the Project Delivery Partner shall lead and manage an integrated Project delivery team that will include resources from CLRL, other CLRL consultants and key third parties. The Project Delivery Partner will be co-located in CLRL's offices.

5.2.8 Figure 5.2.3 shows the proposed matrix organisation for the delivery of the Central Section Project. The underlying principles being:

- An integrated Project delivery team;
- Project delivery team formulated for a smooth transition from scheme design, to finalisation of Central Section definition, detailed design, procurement and construction and co-located as far as possible;

- Strong leadership for each works package by project managers with substantial experience and fully accountable for delivery of all stages of Project development;
- Strong discipline leadership for each major discipline across the Project;
- Efficient organisation with few management layers, streamlining of technical and administrative resources, common processes and a common data environment;
- Project Delivery Partner and CLRL personnel to be in key leadership positions to effectively manage, control and drive delivery so as to achieve certainty in outcomes (cost, programme, quality and safety);
- Commercial terms to incentivise production of the most economical design and construction that meets key stakeholder objectives and aligns behaviours; and
- Ability to rotate staff as the Central Section Project and the Programme progresses to help succession planning.

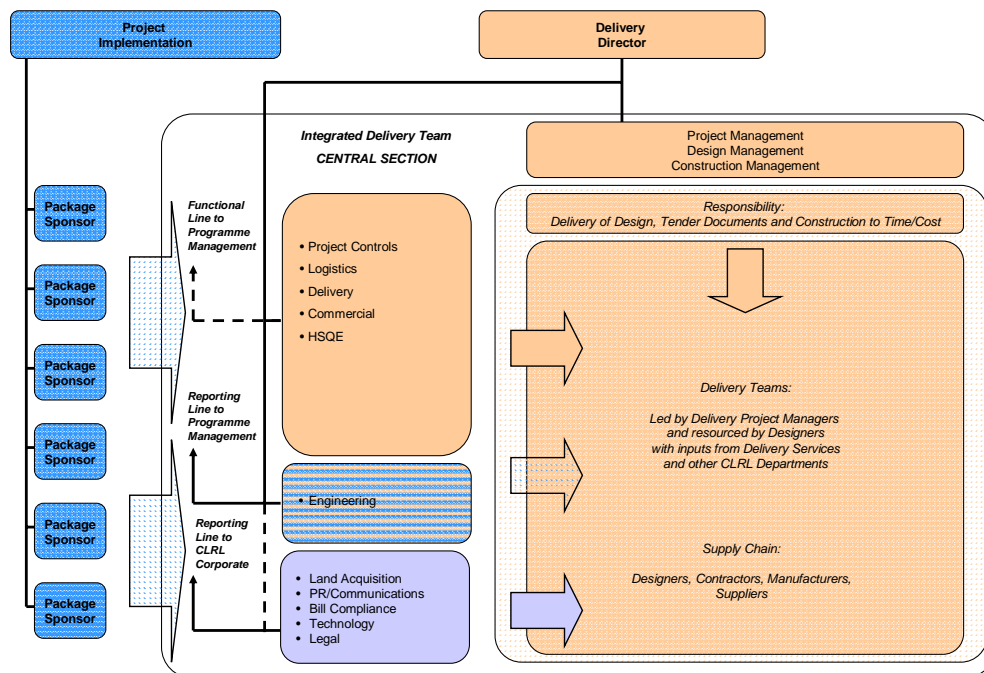
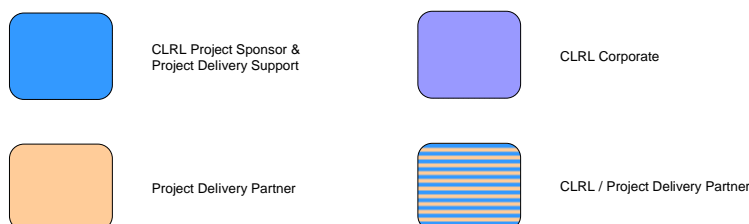
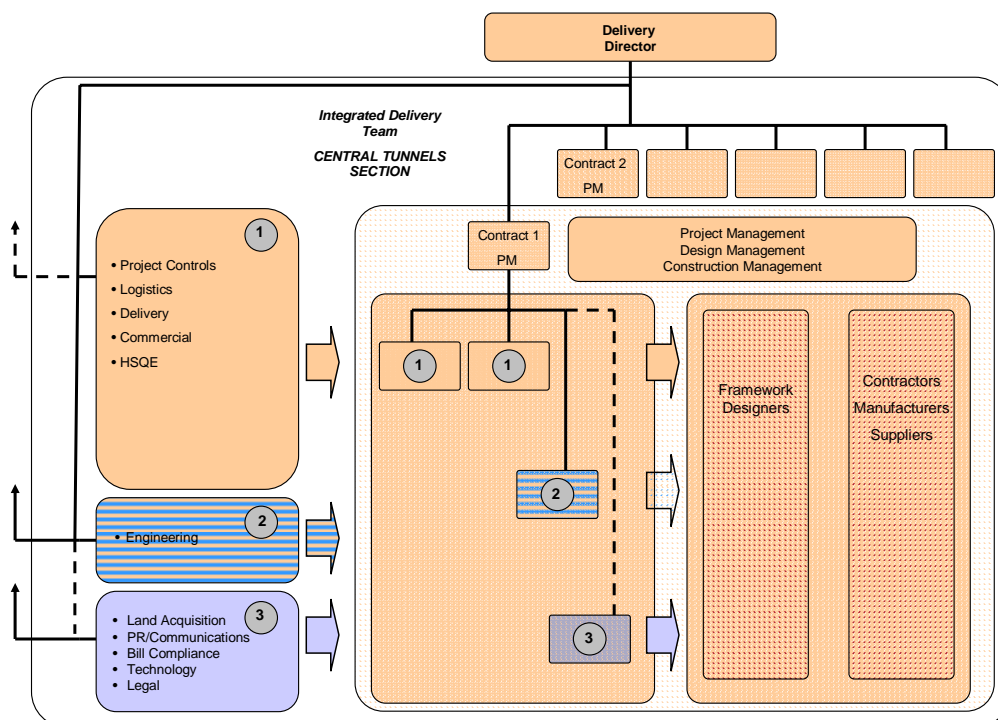


Figure 5.2.3
Central Section
Proposed Project Matrix Organisation
During Delivery Phase (Post Royal Assent)



5.2.9 As with the Programme team, the division of responsibilities within the Project delivery team will be crucial and roles and responsibilities will be defined as part of the procurement of the Project Delivery Partner.

5.2.10 Figure 5.2.4 develops Figure 5.2.3 to illustrate how the Project delivery team would manage discrete sections of the Project or work packages, utilising Design Framework Consultants to carry out detailed design and contractors appointed by CLRL for construction, manufacture and installation.



CLRL Supply Chain

Figure 5.2.4
Central Section
Proposed Project Matrix at a Contract Level
During Delivery Phase (Post Royal Assent)

5.2.11 CLRL package sponsors

The CLRL package sponsors will have overall leadership, on behalf of CLRL, of their respective areas to deliver all phases of the Central Section Project: design, procurement, construction and commissioning. Their primary accountability will be to ensure that the Project is completed safely, to required environmental and quality standards, within budget and to schedule.

Key areas of responsibility for the package sponsors will be as follows:

- Clarifying stakeholder requirements and expectations and communicating these to the Project delivery team;

- Ensuring compliance with applicable standards, codes and regulations, and third party obligations arising from the Crossrail Act;
- Coordinating the various functional groups (Engineering, Procurement, Construction, Commissioning, Project Controls, HSQE) within the Programme and Project Delivery organisations;
- Directing the planning and development of project execution plans, scope definition, project procedures, budgets and project schedules;
- Overseeing the review and approval of project control plans including trend programmes, cost estimates, forecasts, schedules, and financial reports, and reviewing any commitments that exceed assigned budgets;
- Conducting periodic meetings to review progress, discuss project issues and ensure that actions are assigned and closed;
- Managing the risk identification, assessment and mitigation process including approving the release, where necessary, of the associated cost allowance; and
- Championing alliance behaviours and team building practices across the Programme and project delivery organisations.

The package sponsors will report to the Programme Implementation Director.

5.3 Organisational Definition - Programme Team

- 5.3.1 The Programme team shall work to the requirements of the Project Development Agreement, the CPFR, all CLRL policies, processes and procedures and shall be responsible for ensuring that such requirements are delivered.

5.4 Scope of Services – Others

5.4.1 Crossrail Designers

The development phase of the Crossrail Programme is due for completion in summer 2008, and will result in a single option design solution for most locations to a level of detail broadly synonymous with RIBA stage D (Scheme Design) and GRIP Stage 3 plus.

This design development work has been carried out to date by the MDCs who continue to support the critical aspects of advanced works, but whose contracts will be concluded when the new Design Framework Consultant arrangements are established.

CLRL intends to appoint a number of Design Framework Consultants to further develop the Scheme Design for the Central Section to the level of detail required to establish construction contracts (Detailed Design Phase) and to manage the design for CLRL during construction (Implementation Phase).

The proposed scopes of work for the Design Framework Consultants services are as follows:

- **Tunnels and Shafts (and sprayed concrete lining sections),** including:

Civil, structural, geotechnical, drainage, ground movement and mitigation; ventilation, aerodynamics and all E&M equipment (excluding rail systems); Track System Design including track slab; Fire Engineering; TBM Specification; Space Co-ordination; Shafts & Ancillary Building Architecture, Building Services, Lifts, Utilities & Fire Engineering; Environmental, Town Planning & Traffic/Transportation Design and Consents.

- **Central Stations & Portals,** including:

Civil, Structural, Geotechnical, Drainage, Ground Movement & Mitigation;
Architecture; Building Services; Lifts & Escalators; Utilities; Fire Engineering; Environmental; Town Planning & Traffic/Transportation Design and Consents.

- **Rail Systems,** including:

Rolling Stock Systems, Signalling, Traction Power and OLE, Bulk Power Distribution, HV installations, Platform Edge Doors, Systems Integration.

- **Communications and Control Systems,** including:

CCTV, Public Address, Access Control and Detection; Trunk Mobile Radio; PABX; SCADA, Automatic Revenue Collection; Master Systems Integration; Station Control Systems.

- **Architectural Component Design;** and
- **Materials and Workmanship Specification**

Packages of design work may subsequently be let for any design element of a category, any design element across categories or the provision of design resources to CLRL within a category. The packages of design work are expected to contain the following scope:

- Development of the Scheme Design to a pre-construction design status;
- Specialist studies and technical support to Crossrail;
- Detailed design arising from changes during construction;
- Checking of contractor's design during construction; and
- Supporting the supervision of construction to ensure site engineering maintains the integrity of the design.

5.4.2 Enabling Works Managing Agent, Central Section

The EWMA (Taylor Woodrow Construction Limited, under a contract which is due to expire in November 09) is responsible for developing and managing a programme of detailed design development for all enabling works including utility works. Enabling works includes advanced works, i.e. those enabling works which are required to be undertaken prior to the construction of the main contract works.

The role of the EWMA in the management of enabling works for the Central Section only, includes:

- The management of Statutory Undertakers in the production of their detailed designs, costs and programmes for the diversion and/or protection of their utility apparatus;
- Management of contractors and Design Framework Consultants undertaking site surveys on third party assets for enabling works;
- Producing co-ordinated schemes including inputs into value engineering of the utility works/main works;
- Development of the enabling works scope and production of cost estimates and programmes including the co-ordinated design/enabling works activities;
- Recommending the contract/procurement strategy for the delivery of enabling works including whether work packages should be let as separate enabling works contracts or be part of the main construction contracts;
- Identification of long-lead materials and booking outages;
- Providing programme input to optimise the enabling works/main works interface;
- Liaison with the designers to develop an integrated design; and
- Monitoring and reporting on progress of all their deliverables.

The Design Framework Consultants will be responsible for identifying and designing enabling works within their designated area and ensuring that the overall design meets Crossrail's requirements.

The Design Framework Consultants are required to produce detailed designs to allow the EWMA to develop the enabling works to programme.

The EWMA's work categories include Public Utility Diversions; Traffic Management; Monitoring, Structural, Defect and Condition Surveys; Network Rail & LU Infrastructure Modifications; and Advance Protection and Civils Works

6.0 CLRL Systems, Processes and Procedures

6.1 Management Tools

CLRL shall be responsible for the provision and support of the whole IT infrastructure for CLRL and Programme Partner personnel working at CLRL offices to support Programme obligations and requirements.

These services shall cover provision of equipment, standard tools, help desk support, back-up, security and disaster recovery management. CLRL shall also provide business applications which shall include the following:

- Programme Control Tools including programme management and planning package (Primavera)
- Financial Information and Management System (FIMS);
- Document Management System (Documentum);
- CAD provided by Bentley MicroStation;
- CDM and Incident Management;
- Security Management; and
- Logistics

A dedicated IT development function will be provided by CLRL to provide business applications as required.

6.2 Document/Contract Management Systems

6.2.1 tsaADVET CAB-i-NET (for CAD Drawings)

CAB-i-NET is scheduled for replacement with **ProjectWise** during third Quarter 2008. The new system will then assume the control of spatial information (models and drawing) elements in the Common Data Environment (CDE).

6.2.2 IBM Lotus Domino Document Manager

Domino.Doc manages Programme documentation which is not part of the CDE (Common Design Environment). It is a suite of Domino databases served principally via browser interface (Crossrail Workplace) and through a Windows Explorer interface known as "Neighborhood". Domino.doc is the current platform on which the Crossrail Document Control System (DCS) is implemented. This is scheduled for replacement by **Documentum** in late 2008.

6.2.3 ACT (Crossrail Contact Management System)

A Lotus Notes database which predates Domino.Doc and which stores all contacts and correspondence relating to the consultation aspect of the project. ACT is scheduled for replacement by the Crossrail stakeholder data base (CSDB) during 3rd Quarter 2008.

6.2.4 The Crossrail Image Library

A secure network-drive-based repository containing the digital photographs and commonly used visualisations, diagrams and illustrations which have internal, public and historical significance to the Programme.

6.3 Key Specification Documents

Key specification documents include:

- Crossrail Statement of Objectives
- Sponsors' Requirements
- Business Case
- Operational Response
- Crossrail Project Functional Requirements (CPFR)
- Project Scope Document
- Project Implementation Plan
- Civil Design Manual
- Environmental Minimum Requirements
- Architectural and M & E Design Manual
- Master Programme
- Assumptions Register
- Strategic Risk Management Plan
- Crossrail Proposition
- Undertakings and Assurances Register
- Delivery Strategy
- Value Improvement Register
- Bill Documents
- Commercial agreements

All other documents can be found on the Master Register

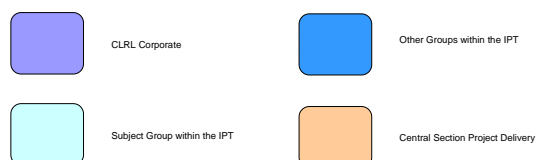
7.0 Programme and Cost Profile

7.1 Programme Master Schedule & Cost Profile

Copies of the latest Crossrail Programme Master Schedule and Cost Profile, together with Programme constraints, milestones and deliverables are contained within CLRL's data room.

Appendix A Programme Team Illustrative Organisation

This Appendix outlines the proposed organisation at a Programme level and provides an indication of the roles that will be undertaken by the integrated Programme team. The scope of services for the Programme Partner is set out in Part 2 of the respective ITT.



A.1 Engineering and Assurance

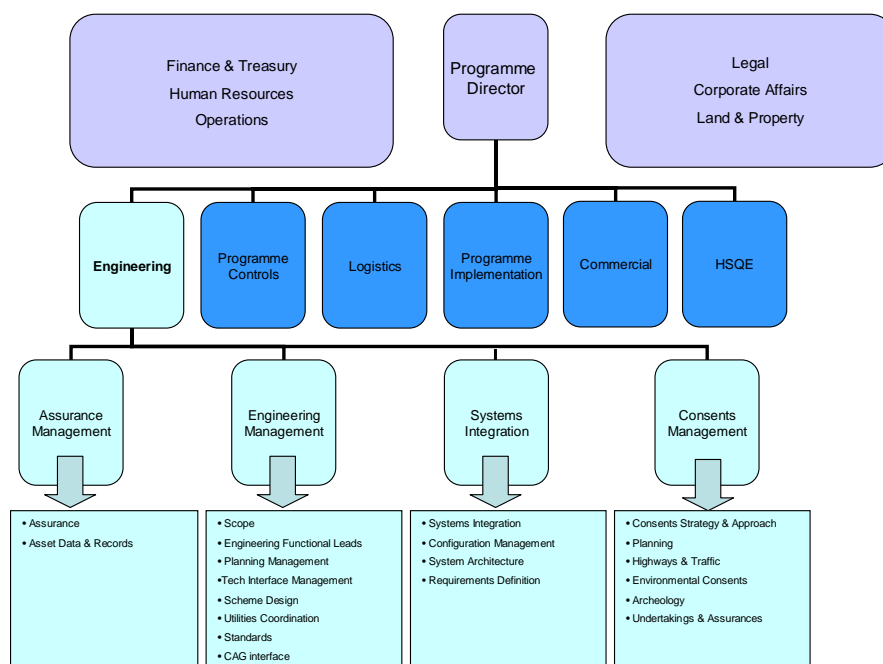


Figure A.1.1
Programme Team - Engineering

Assurance

- The verification and validation of regulatory, Sponsor and Operator requirements on a progressive basis, in order to facilitate the hand over of the Crossrail infrastructure to include, but not limited to, the railway, stations, shafts and associated facilities to the various operators for trial running and for operational service on completion of testing and commissioning.
- Engineering assurance that standards and design criteria have been followed and lessons learned applied.

Engineering Management

- Development and implementation of Crossrail's Programme-wide standards.
- Development and implementation of Crossrail's engineering and technology delivery strategy, including Crossrail's design management strategy for civil engineering works, railway systems, utility works, buildings, M&E systems etc.
- Compliance with the Sponsors' Requirements, together with CLRL's day to day requirements, the definition of scope and the subsequent management of change through programme controls.
- Develop the strategy and manage implementation of the process for obtaining all necessary acceptances and approvals for the Programme.

Systems Integration

- Development of operational needs into a systems specification, a description of system performance parameters and system configuration.
- Integration of related technical parameters and design and construction to meet systems specification at a Programme level.
- Development and implementation of configuration management systems.

Planning and Consents

- Management of all necessary planning, environmental and traffic and highways consent issues at a Programme level, including those under the enabling legislation, to ensure:
 - that all appropriate permissions are received in a timely manner;
 - that they are configured with adjoining developments and systems; and
 - that all third party obligations, Undertakings and Assurances are fulfilled.

A.2 Programme Controls

Programme Development & Planning

- Establish the framework through which the Programme will be developed and implemented, including:
 - Programme execution strategies;
 - Programme organisation and communication lines;
 - Programme reviews;
 - the implementation of the Programme's collaborative and partnering delivery culture; and
 - Programme procedures.

Programme Controls and Reporting

- The provision of management tools that will control the Programme and its individual projects, including the development and implementation of reporting tools and procedures, which will need to be tailored to suit Crossrail's existing systems and proposed organisational structure and delivery strategy.
- These will include scope management, master schedule and budget, Programme wide work breakdown structure, performance assessment, reporting, change management and document controls.

Schedule Planning, Monitoring and Control

- The management, monitoring, reporting and control of schedule at a Programme level, including overall programme planning and an integrated master schedule.

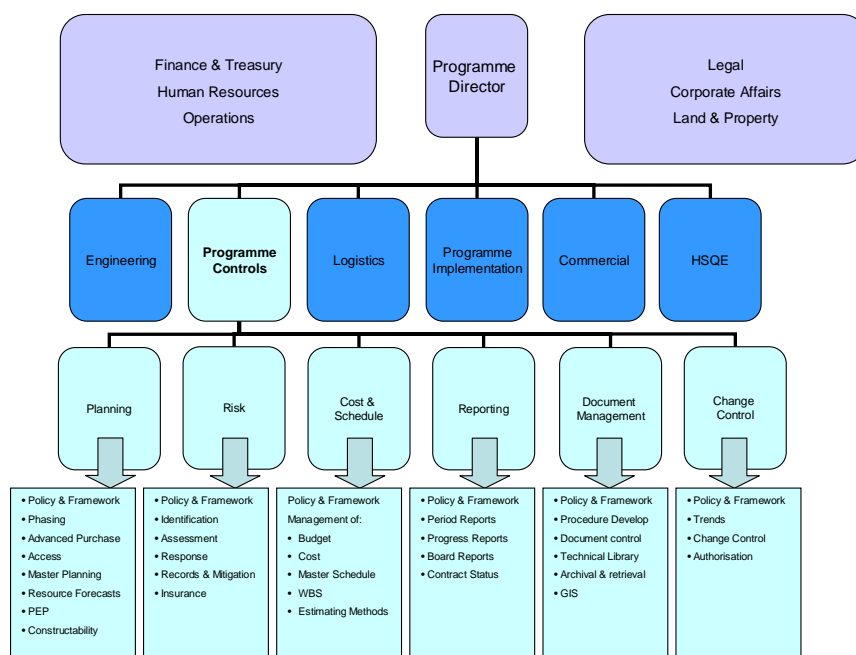


Figure A.2.1
Programme Team – Programme Controls

Risk & Opportunity Monitoring and Control

- The systematic application of programme management tools to identify risks and opportunities and to actively manage them throughout the Programme.

Cost Monitoring and Control

- Cost management, monitoring, reporting and control of Crossrail at a Programme level, including estimates of the cost of the works and any actual or prospective change.

A.3 Logistics

Logistical Planning & Management, including Supply Chain

- Development and implementation of Crossrail's Programme-wide logistics strategy.
- Including co-ordination with other major infrastructure projects and planning for and securing critical staff, plant, machinery and materials, to ensure their availability when and where they are needed to meet Programme and project priorities.
- To undertake its duties across all projects the logistics function will require both functional and geographical management.

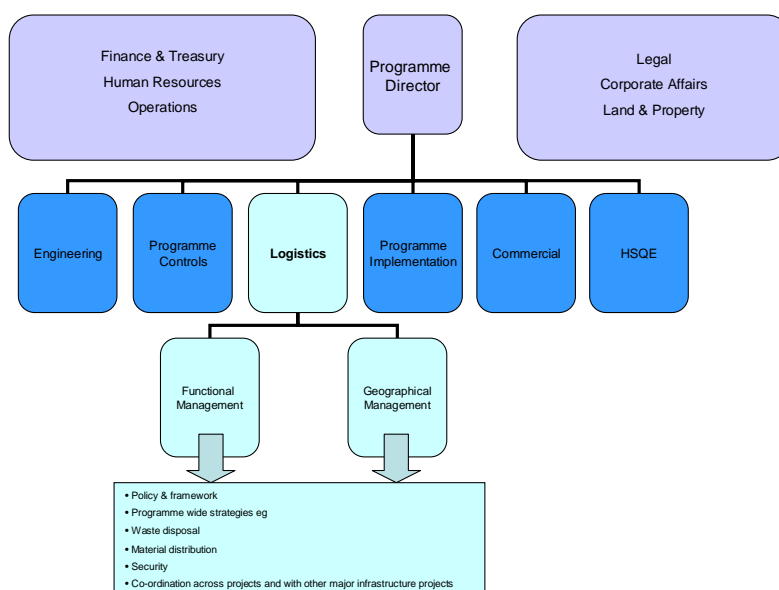


Figure A.3.1
Programme Team - Logistics

A.4 Delivery

Programme Management

- Day to day Programme management of a number of concurrent projects and procurements making up the Programme, from design through procurement and into construction or manufacture or implementation and up to and including hand over into service.

Interface & Stakeholder Management

- Development and management of Crossrail's interface, Stakeholder and third party management strategy, incorporating and mitigating dependencies from related bodies and projects at a Programme level.
- Appropriate liaison and coordination with third parties to ensure that timely decisions are reached to avoid Programme and project delays and cost overruns.

Manufacture and Production Supervision

- Establishment and management of Crossrail's strategy for the control of manufacture and production across a diverse set of projects, ensuring consistency, quality and completion to meet Programme and project priorities.

Construction Planning and Management

- Development and implementation of CLRL's construction strategy to provide uniform control of construction across a diverse set of projects, ensuring consistency, quality and completion to meet Programme and project priorities.
- Construction planning and management will include value engineering and constructability reviews during the design development and execution phases and the programme management oversight of all necessary access requirements (including railway possession notices and procedures).

Management of Systems Implementation

- Development and management of Crossrail's strategy for the management of systems implementation, to deliver uniform control of systems implementation across a diverse set of projects, ensuring consistency, quality and completion to meet Programme and project priorities.
- Systems implementation management strategy will include value engineering and constructability reviews during the design development and execution phases.

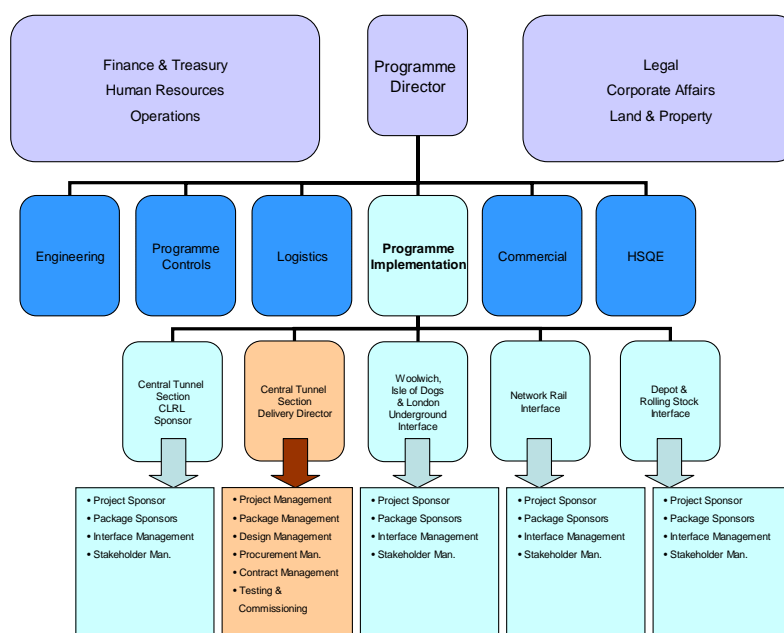


Figure A.4.1
Programme Team - Delivery

Test and Commissioning Supervision

- Provision and execution of commissioning plans that will ensure a smooth transition from construction to operation.

Trial Running & Handover to the Operators

- Trial running and handover of the Crossrail infrastructure to include, but not limited to, the railway, stations, shafts and associated facilities to the various operators.

A.5 Commercial

Programme Procurement

- Development and implementation of Crossrail's Procurement and Contracting strategy at a Programme level.

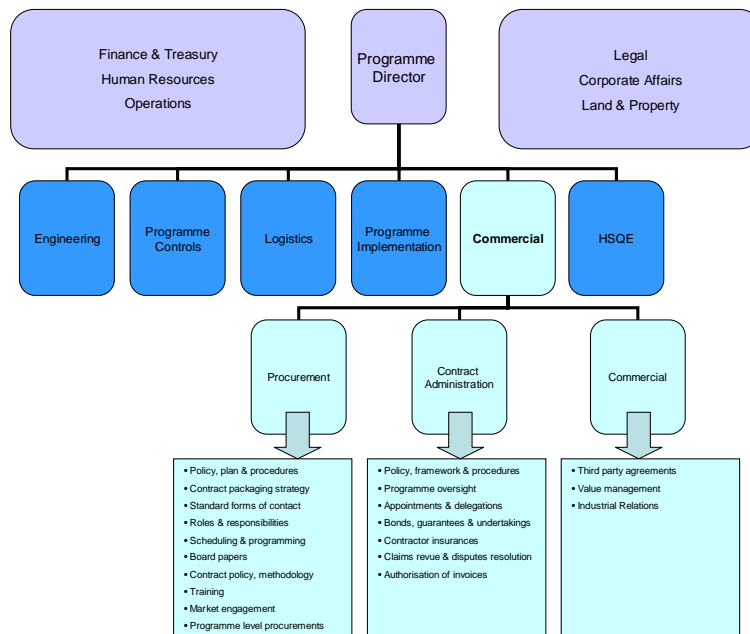


Figure A.5.1
Programme Team - Commercial

Contract Administration

- Establishment and management of Crossrail's contract administration strategy across a diverse set of projects from contract award to final account.

Commercial

- The development and implementation of CLRL's Programme-wide industrial relations and labour strategy at a Programme, project and contract level. Value management at pre-agreed stages and implementation of agreed outputs.

A.6 Heath & Safety, Quality and Environment

Health and Safety

- The development and implementation of safety management strategies and procedures that provide safety assurance to CLRL's Sponsors and achieves effective co-ordination of H&S and management of H&S compliance throughout the Programme.

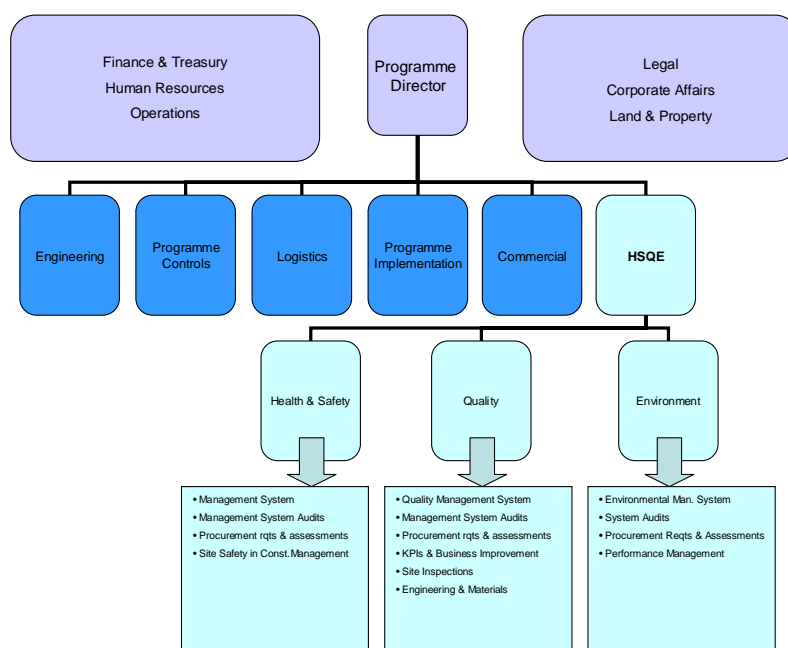


Figure A.6.1
Programme Team - HSQE

Environmental Management

- The development and management of CLRL's environmental management policies and procedures at the Programme level and the management of compliance with those environmental policies and procedures throughout the Programme.

Quality Management

- The development, implementation and maintenance of a quality management system to support the effective and efficient delivery of the Programme.
- The management system shall align with the CLRL corporate arrangements for managing quality and be designed to continually improve performance.

A.7 CLRL Corporate

Public Relations and Communications Management

- Dissemination of Programme and project information through the media, websites, and other publications or relevant outlets and the presentation of programme and project status to interested and affected members of the public, as well as addressing public concerns and ensuring that all CLRL staff and the Programme and Project Delivery Partners remain fully briefed.

Operations / Railway Services

- To ensure the delivered railways systems meet operational and safety requirements.
- CPFR co-ordinator and customer.
- Maintenance of operational cost and performance measurement models.
- Operational input during construction (planning) and commissioning.
- Operational representation for future upgrades.
- Provision of shadow TOC function.

Land and Property

- Acquisition of the land required for Crossrail and the development and management of all associated agreements.
- Land access, compensation agreements, consents and notices.

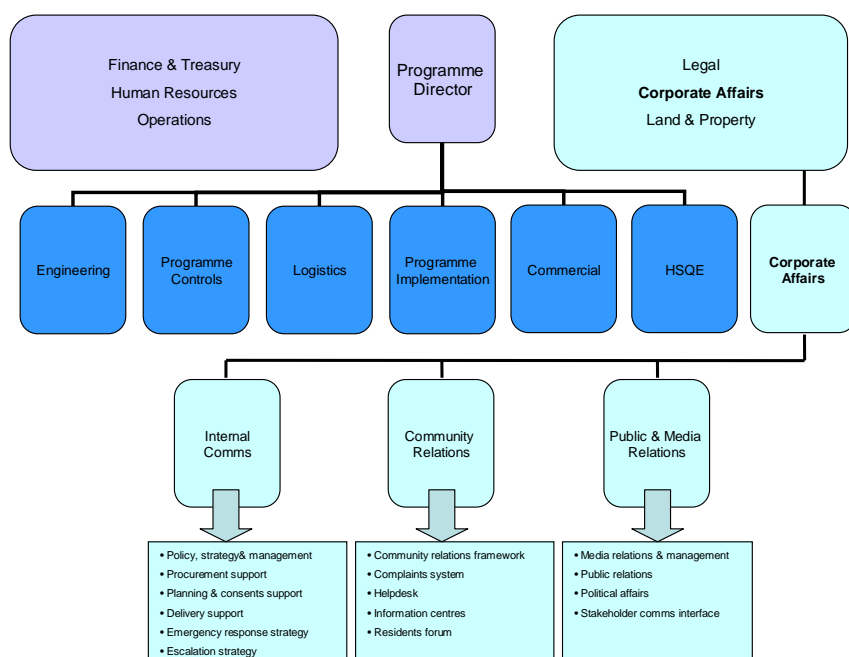


Figure A.7.1
Programme Team – PR/Communications

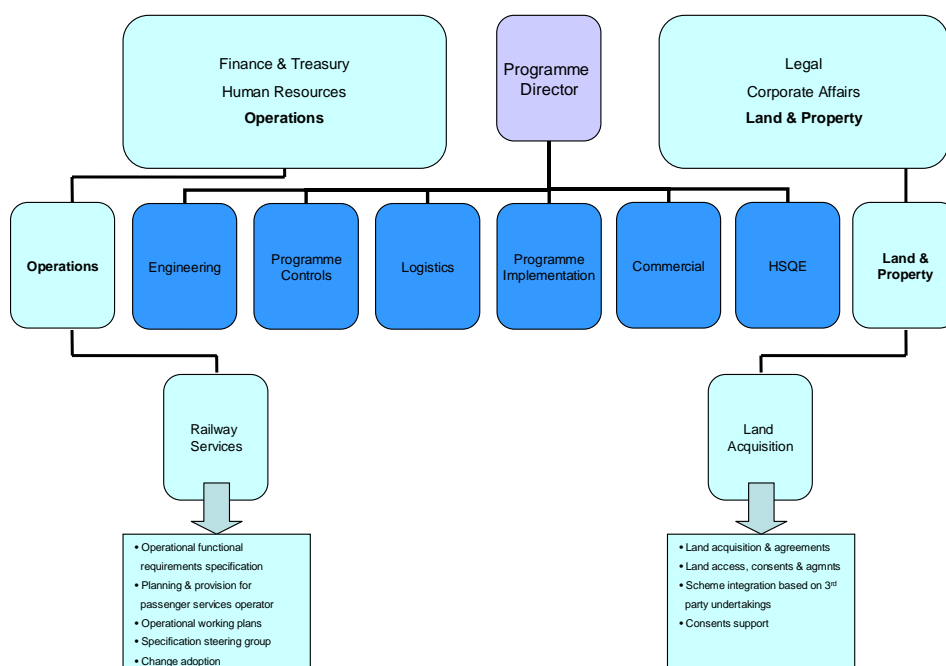


Figure A.8.1
Programme Team – Railway Services & Land/Property

Technology

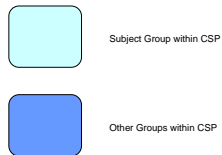
- The development and management of Programme-wide IT systems and infrastructure, including CLRL's SAP core financial and purchasing system, and business continuity issues in support of CLRL's existing capabilities.
- Manage the assurance and integration of the computer based systems used for the railway operations including control and communications, and supporting other assurance works for signalling, rolling stock and mechanical and electrical services provided through Engineering.

Human Resources

- The management of human resource issues, including the development and implementation of HR strategies, policies and procedures for the effective recruitment, development, motivation and retention of staff.

Appendix B Project Team Illustrative Organisation

This Appendix outlines the proposed organisation for the Central Section Project and provides an indication of the roles that will be undertaken by the integrated Project delivery team. The scope of services for the Project Delivery Partner is set out in Part 2 of the respective ITT.



B.1 Central Section, Project Management

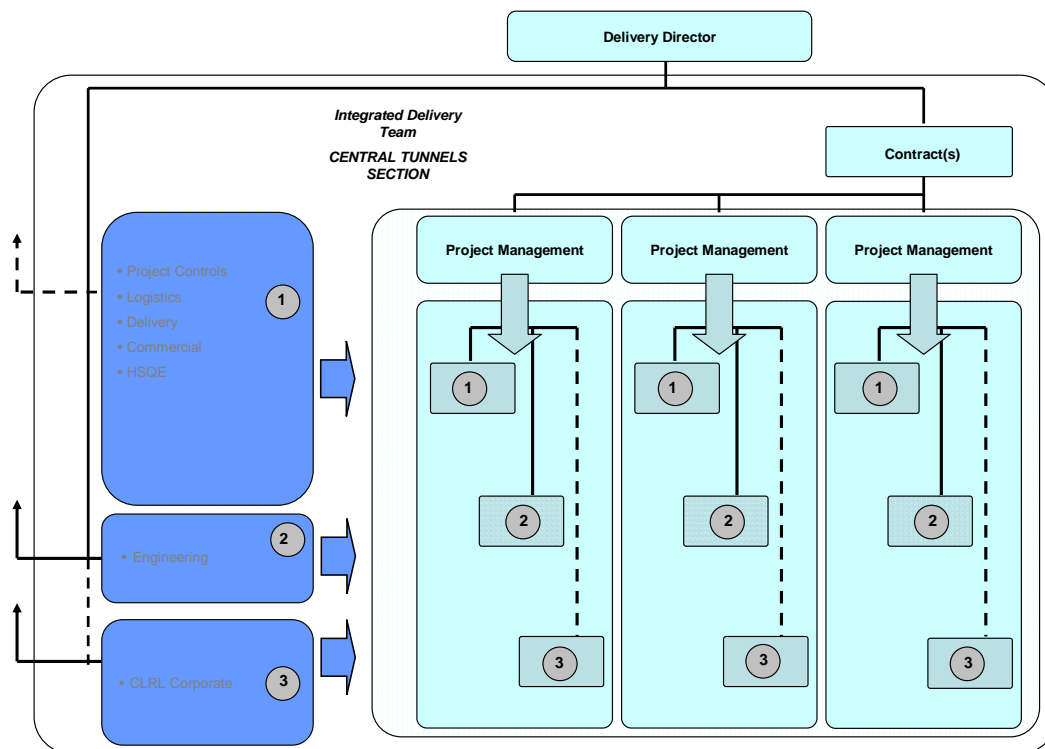


Figure B.1.1
Central Section, Project Delivery Team – Project Management

Project Management

- Day to day management of a number of concurrent contracts and procurements making up the Central Section Project, from design to procurement and into construction or manufacture or implementation and up to and including hand over into service.

B.2 Engineering

Assurance

- The verification and validation of regulatory, Sponsor and Operator requirements on a progressive basis, in order to facilitate the hand over of the Crossrail infrastructure to include, but not limited to, the railway, stations, shafts and associated facilities to the various operators for trial running and for operational service on completion of testing and commissioning.
- Engineering assurance that standards and design criteria have been followed and lessons learned applied. Demonstration of safety in terms of technical/operations/maintenance safety; demonstration of an ALARP solution and assurance. Allowance for audits.

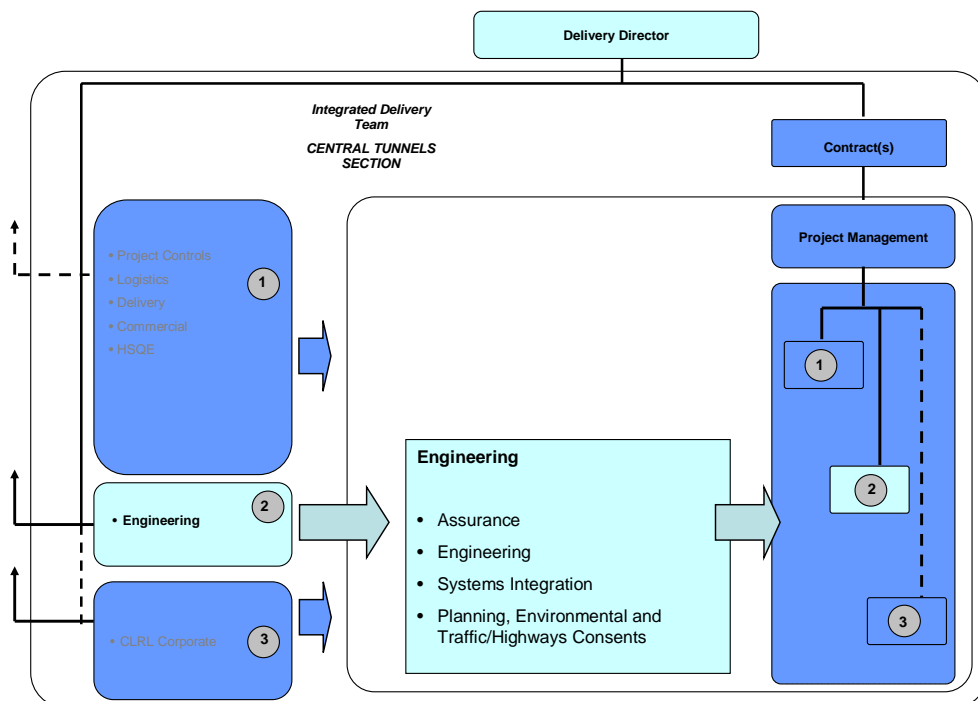


Figure B.2.1
Central Section, Project Delivery Team – Engineering

Engineering

- Compliance with the Sponsors' Requirements and the CPFR, together with CLRL's day to day requirements, the definition of scope and the subsequent management of change through project controls.
- Manage the process for obtaining all necessary acceptances and approvals for the Project works.

- Implementation of Crossrail's engineering and technology delivery strategy on the Project, including Crossrail's design management strategy for civil engineering works, railway systems, utility works, buildings, M&E systems etc.

Systems Integration

- Flow down of operational needs through a systems specification, a description of system performance parameters and system configuration at a Project level.
- Integration of related technical parameters and design and construction to meet systems specification at a Project level and in compliance with Programme level requirements and strategies.
- Development and implementation of configuration management systems.

Planning, Environmental and Traffic & Highways Consents

- Management of all necessary planning, environmental, and traffic and highways consents issues at a Project and contract level, including those under the enabling legislation, to ensure that all appropriate permissions are received in a timely manner, that they are configured with adjoining developments and systems and that all third party obligations and undertakings are fulfilled.

B.3 Project Controls

Project Development

- Establish the framework through which the Central Section Project will be developed and implemented, including the Project execution strategy, Project and contract organisations, the implementation of the Programme's collaborative and partnering delivery culture and Project procedures.

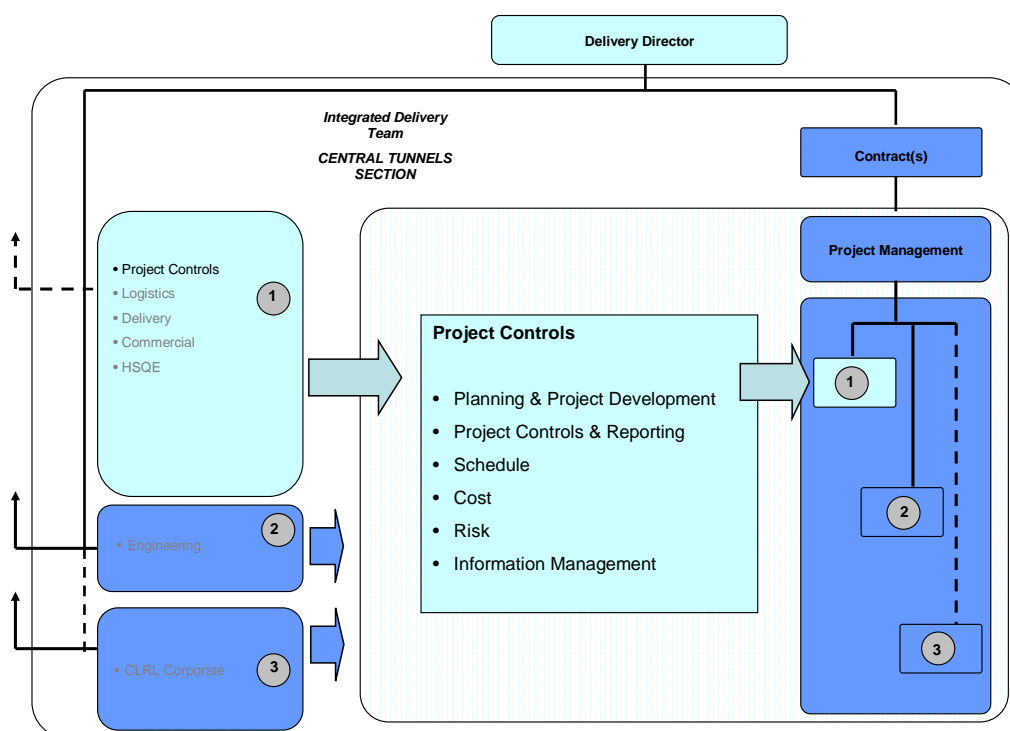


Figure B.3.1
Central Section, Project Delivery Team – Project Controls

Project Controls and Reporting

- The provision of management tools that will control the Central Section Project and its individual contracts including the development and implementation of reporting tools and procedures.
- The management tools will need to be tailored to suit Crossrail's Programme wide systems, organisational structure and delivery strategy.
- These will include, but not be limited to, scope management, master schedule and budget, risk, a programme compliant work breakdown structure, performance assessment, reporting, change management and document controls.

Schedule Planning, Monitoring and Control

- The management, monitoring, reporting and control of schedule at a Project and contract level, including overall Project planning and an integrated master schedule.

Risk Monitoring and Control

- The systematic application of project management tools to identify risks and to actively manage them.

Cost Monitoring and Control

- Cost management of Crossrail at a Project and contract level, including estimates of the cost of the works and any actual or prospective change.

B.4 Logistics

Logistical Planning & Management, including Supply Chain

- Design and implementation of a Central Section Project Delivery Plan that meets the requirements of the Programme wide logistics strategy.
- Compliance and input into Crossrail's Programme wide logistics strategy.
- Planning for and securing critical staff, plant, machinery and materials, to ensure their availability when and where they are needed to meet Programme and Project priorities.

Security

- Implementation and management of Crossrail's Programme-wide security strategy on the Central Section Project.

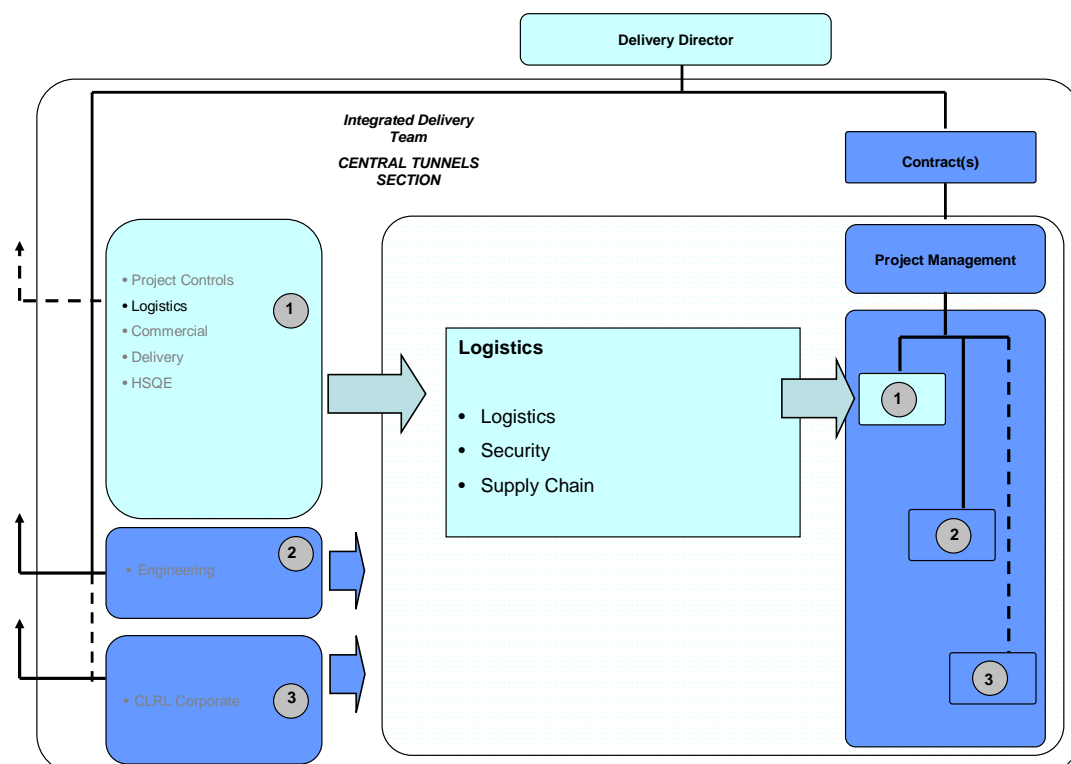


Figure B.4.1
Central Section, Project Delivery Team – Logistics

B.5 Delivery

Design Management

- The packaging, tendering, administration and management of detailed design contracts and all associated surveys for civil engineering, building, utility and railway systems works.
- Design will be progressed through a series of delivery options including conventional engineering-procurement-construction and design/build type contracts.
- Design will be compliant with Sponsor and CLRL requirements and standards.
- The Project Delivery Partner will be required to manage the design through all necessary approvals and acceptance procedures to the required programme, within the required cost and to defined quality standards.

Interface Management

- Incorporation and mitigation of dependencies from related bodies and projects at a Central Section Project level.
- Appropriate liaison and coordination with third parties to ensure that timely decisions are reached to avoid Programme and Project delays and cost overruns and to provide consistent solutions across interfaces.

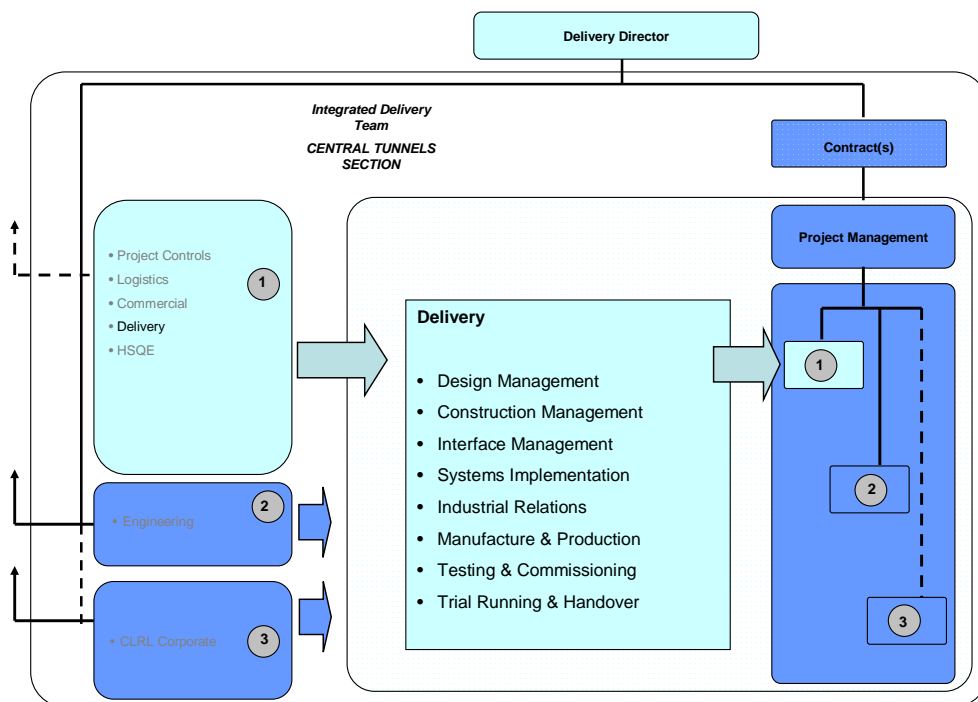


Figure B.5.1
Central Section, Project Delivery Team – Delivery

Construction Planning and Management

- Uniform control of construction across a diverse set of contracts, ensuring consistency, quality and completion to meet Programme and Project priorities.
- Construction planning and management will include value engineering and constructability reviews during the design development and execution phases and all necessary access requirements (including railway possession notices and procedures).

Civils Completion at Handover

- The sequential completion of civils contracts and subsequent handover to rail systems contractors, together with addressing the transfer of CDM responsibilities, completion of records and documentation.

Management of Systems Implementation

- Control of systems implementation to agreed levels of quality and to time and budget across a diverse set of contracts, ensuring consistency, quality and completion to meet Programme and Project priorities.
- Systems implementation management will include value engineering and constructability reviews during the design development and execution phases.

Industrial Relations

- The implementation of CLRL's Programme wide industrial relations and labour strategy at a Project and Contract level.

Manufacture and Production Supervision

- Control of manufacture and production to agreed levels of quality and to time and budget across a diverse set of contracts, ensuring consistency, quality and completion to meet Programme and Project priorities.

Test and Commissioning Supervision

- Provision and execution of commissioning plans that will ensure a smooth transition from construction to operation.

Trial Running & Handover to Operator

- Support to CLRL with trial running and the handover of the Crossrail infrastructure to include, but not limited to, the railway, stations, shafts and associated facilities to the various operators.

B.6 Commercial

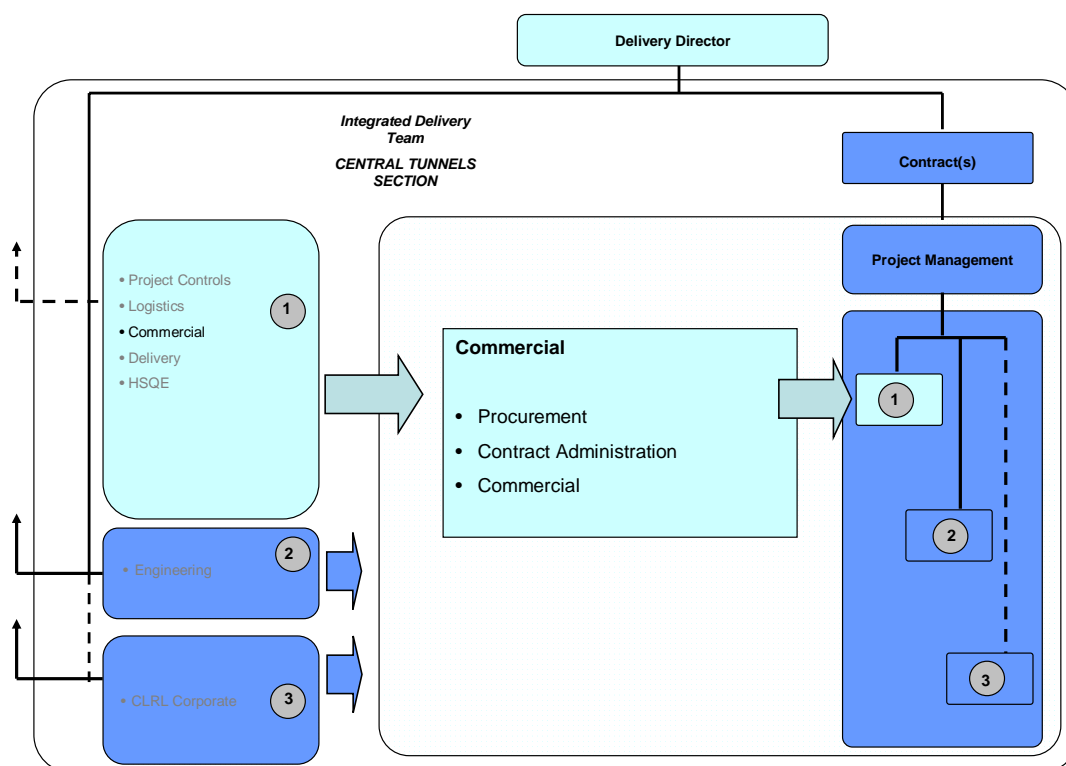


Figure B.6.1
Central Section, Project Delivery Team – Commercial

Project Procurement

- Support to the Programme team with the development of contract terms.
- Management of procurement procedures, the negotiation of contract terms and conditions, and recommendations for award at a Project level.

Contract Administration

- Contract administration of a number of concurrent contracts from contract award to final account.

B.7 HSQE

Health and Safety

- The development and implementation of a safety programme to pro-actively manage H&S in design, construction, and operation, and to ensure compliance with CLRL Safety Management Strategies and Procedures and their management at Project and contract level.

- Appendix D indicates that the bulk of the HSQE staff resource for the Delivery stage will be provided by the Delivery Partner organisation rather than CLRL. However CLRL will retain a directing and/or resourcing role for certain key H&S elements as detailed in Part 2 Scope of Services, Section 6.

Environmental Management

- Compliance with the provisions of CLRL's environmental management system and their management at a Project and contract level. Where necessary develop and implement environmental management procedures at the project level to ensure compliance with CLRL's EMS.

Quality Management

- Implementation, maintenance and continual improvement of a quality management system to support the effective and efficient delivery of the Central Section Project.
- The management system shall align with CLRL's Programme wide arrangements for managing quality.

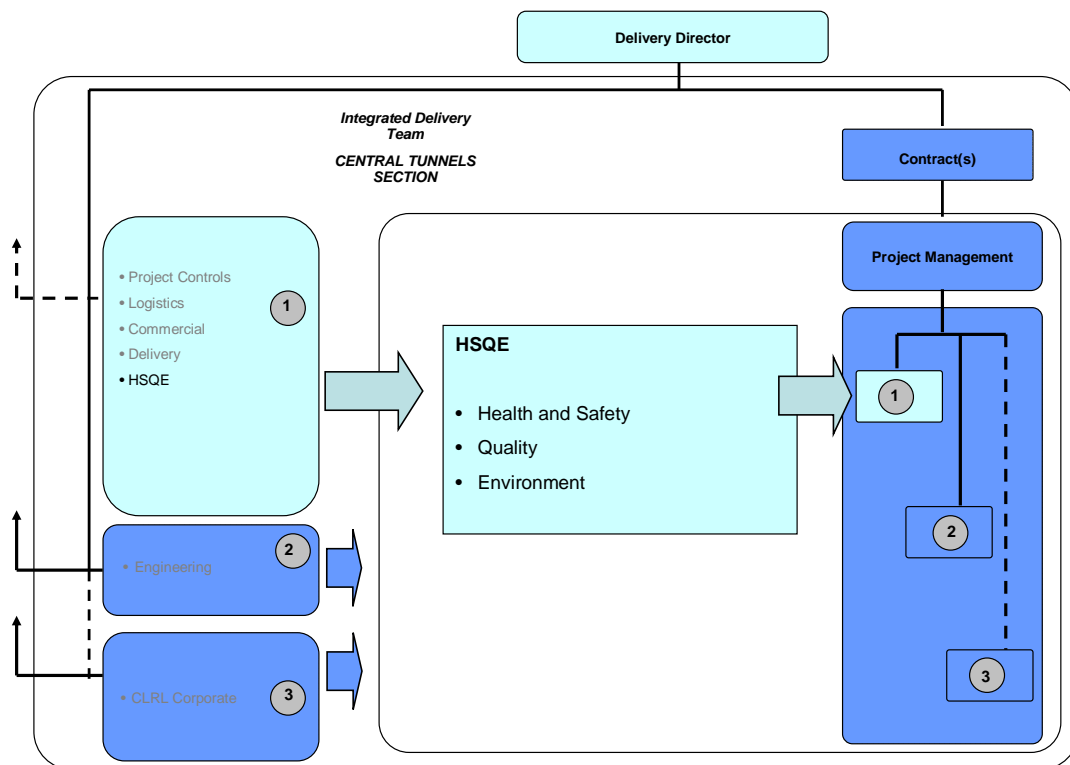


Figure B.7.1
Central Section, Project Delivery Team – HSQE

B.8 CLRL Corporate

Public Relations, Stakeholder & Communications Management

- The Project delivery team will support CLRL with the dissemination and presentation of Programme and Project information through web sites, media and other publications and relevant outlets to interested and affected members of the public, as well as addressing public concerns.

Information Technology & Management

- The Project delivery team will support CLRL with the development and management of a Programme compatible, Project wide IT system, including business continuity issues.
- Manage the assurance and integration of the computer based systems used for the railway operations including control and communications, and supporting other assurance works for signalling, rolling stock and mechanical and electrical services provided through Engineering.

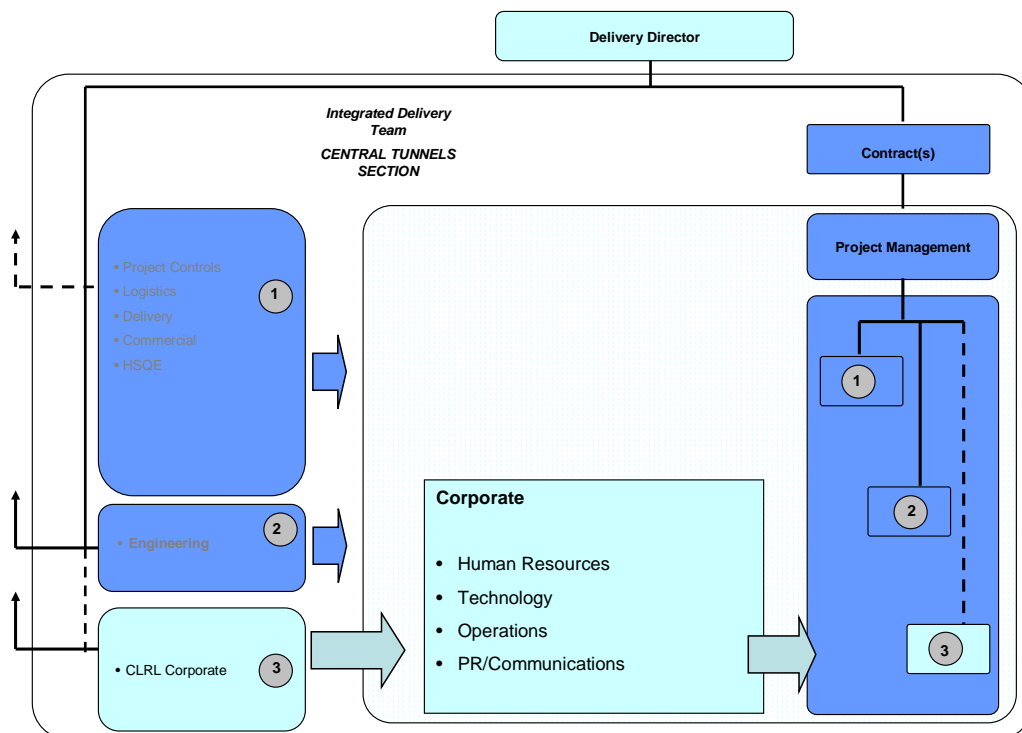


Figure B.8.1
Central Section, Project Delivery Team – CLRL Corporate

Human Resources

- The Project delivery team will support CLRL with the management of all human resource issues for the Project.
- Implementation and compliance with CLRL's employment policies and procedures and its Programme wide strategies including industrial relations, training, continuous professional development, competence and performance assessments.

Operations

- To ensure the delivered railways systems meet operational and safety requirements.
- CPFR co-ordinator and customer.
- Maintenance of operational cost and performance measurement models.
- Operational input during construction (planning) and commissioning.
- Operational representation for future upgrades.
- Provision of shadow TOC function.

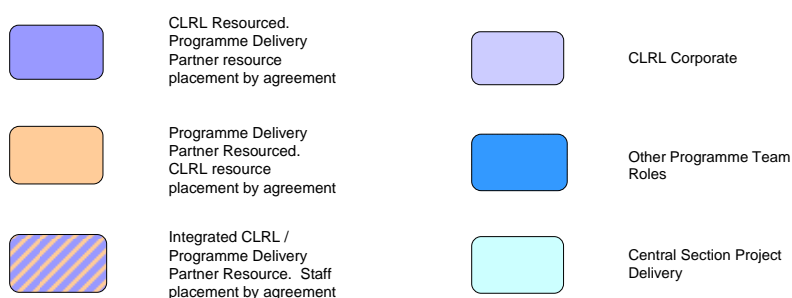
Land and Property

- Acquisition of the land required for Crossrail and the development and management of all associated agreements.
- Land access, compensation agreements, consents and notices.

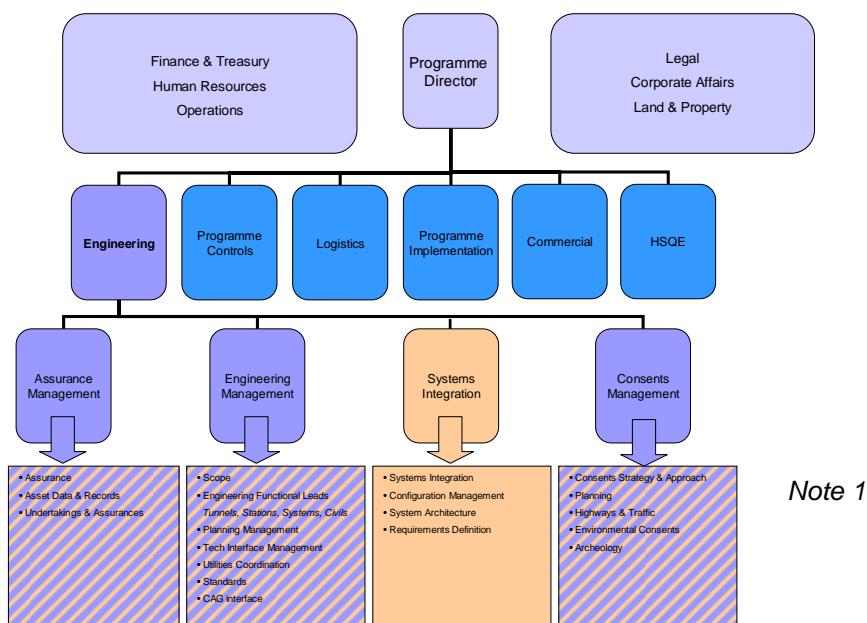
Appendix C Programme Team Indicative Resourcing Responsibilities

The charts provided in this Appendix are based on the organisational structure described in Appendix A and are intended to provide an indication of where Programme Partner services will be required within the integrated Programme team.

The following charts indicate those areas of the integrated Programme team which are expected to be resourced by CLRL, those areas which it is anticipated the Programme Partner will resource and those where a more integrated, “best fit” approach will be adopted. The scope of services for the Programme Delivery Partner is set out in Part 2 of the respective ITT.

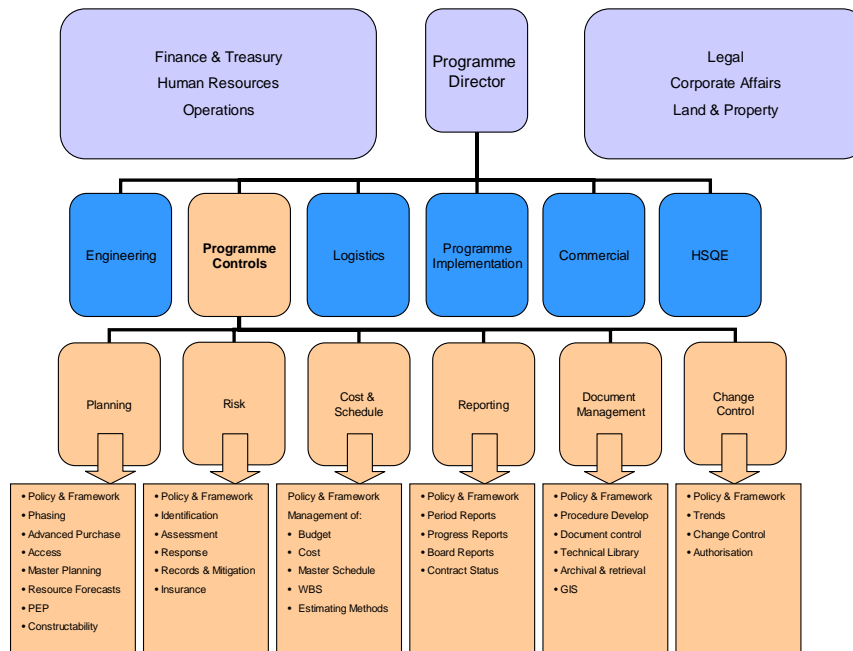


C.1 Engineering and Assurance

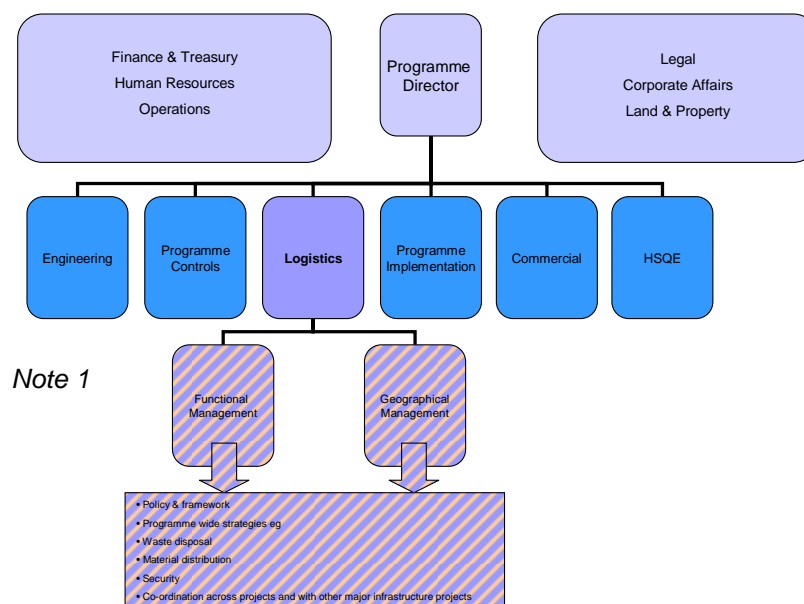


Note 1 – CLRL led, CLRL/Programme Partner support staff

C.2 Programme Controls

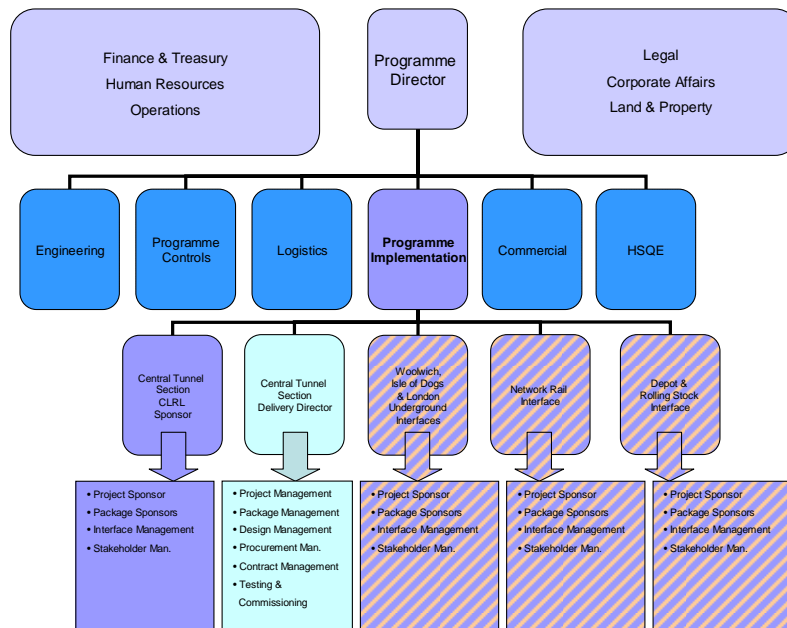


C.3 Logistics

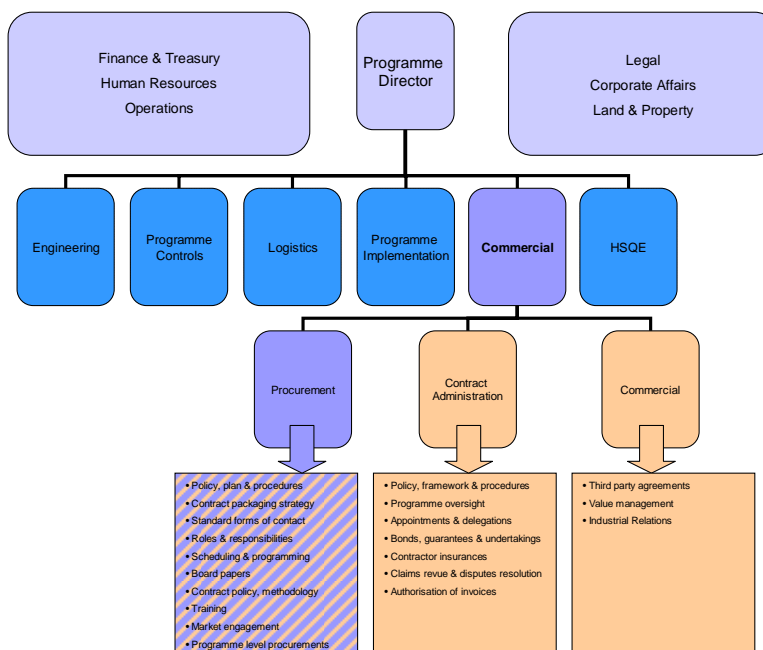


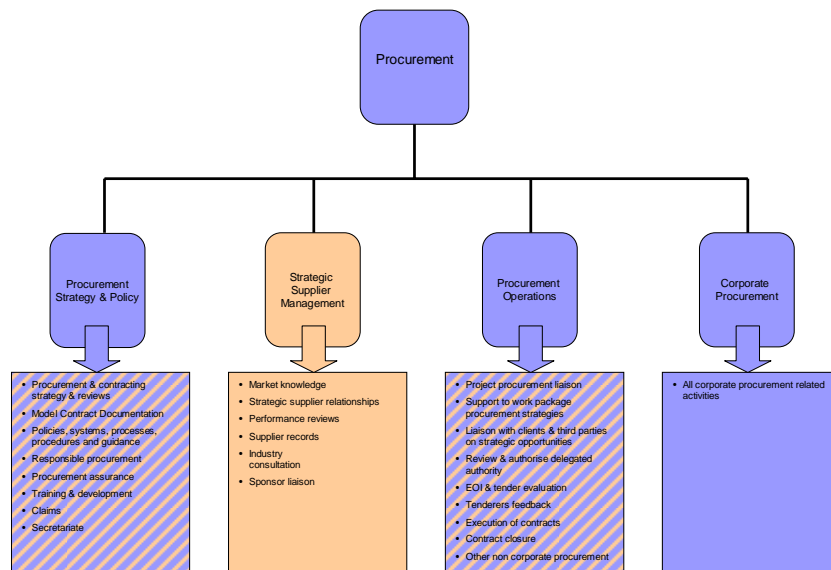
Note 1 – CLRL led, CLRL/Programme Partner support staff

C.4 Programme Implementation

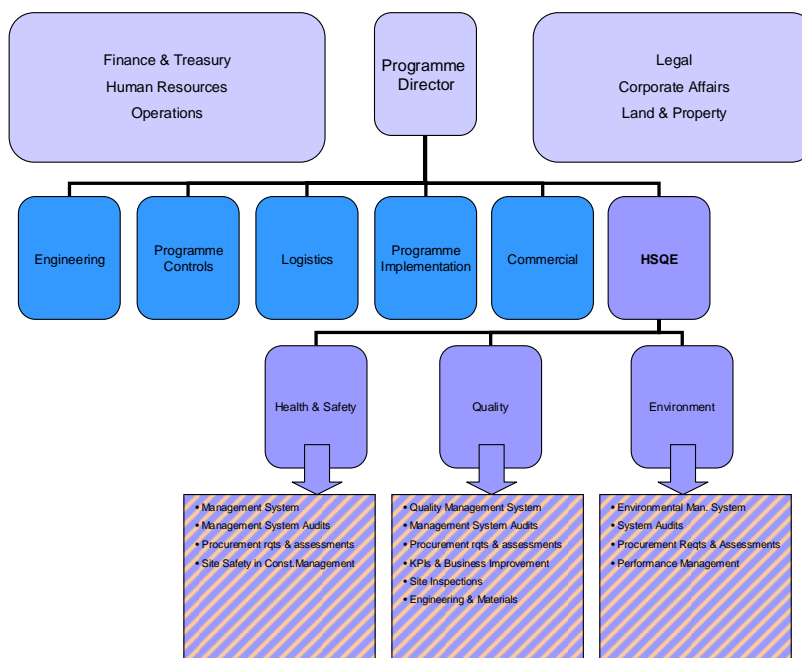


C.5 Commercial

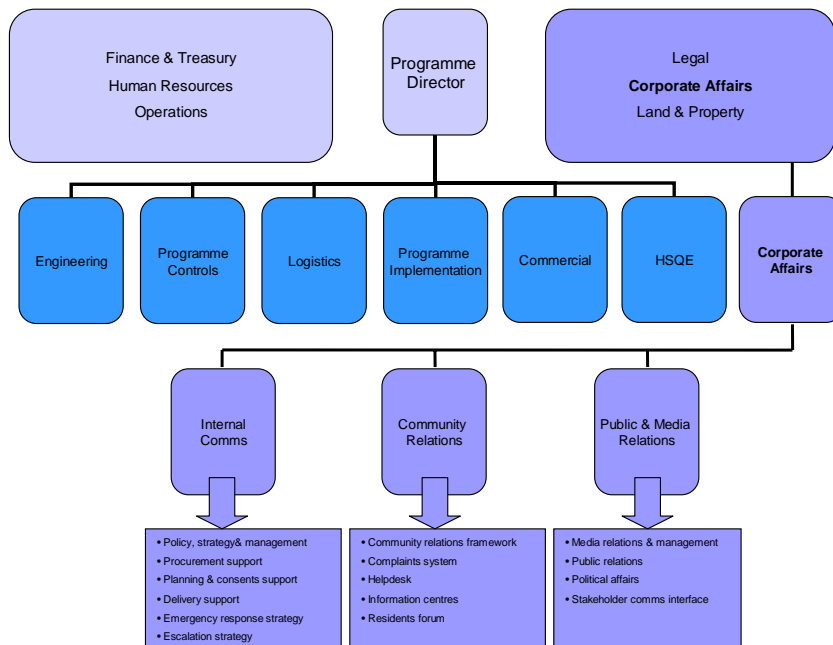




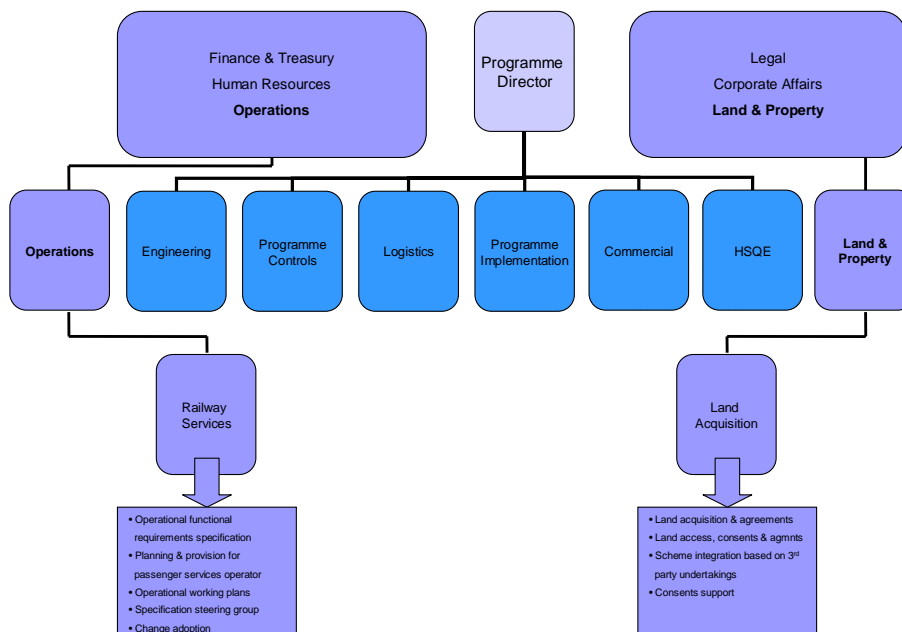
C.6 HSQE



C.7 Communications/PR



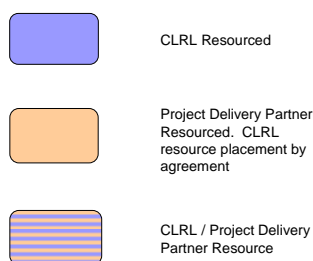
C.8 Operations & Land/Property



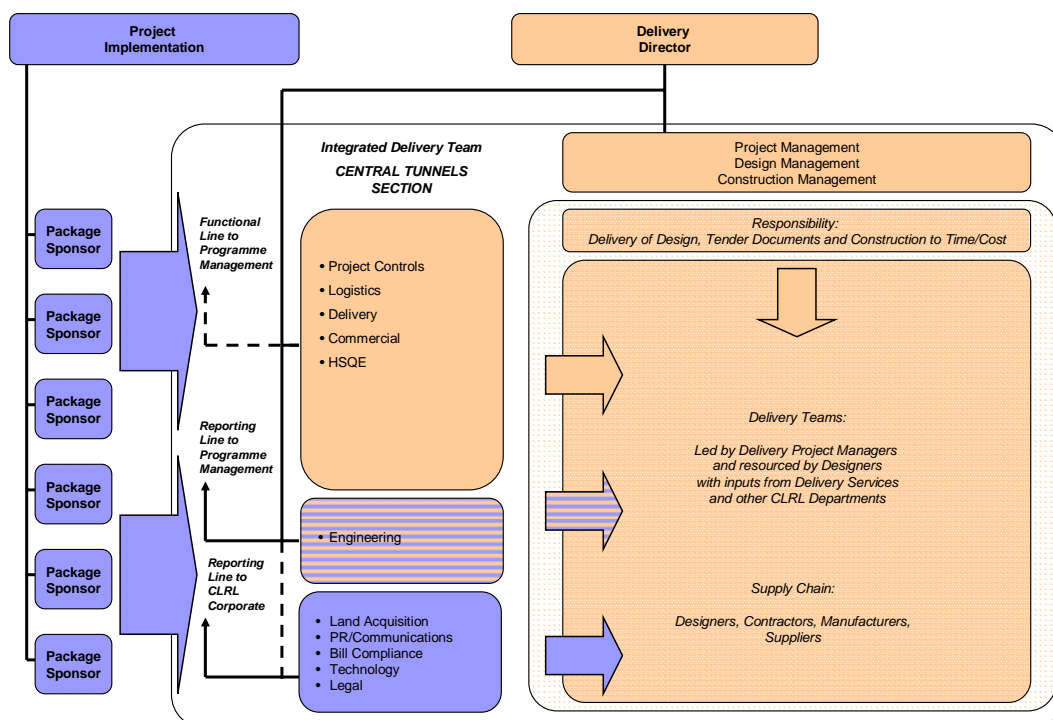
Appendix D Project Team Indicative Resourcing Responsibilities

The charts provided in this Appendix are based on the organisational structure described in Appendix B and are intended to provide an indication of where Project Delivery Partner services will be required within the integrated Central Section Project delivery team.

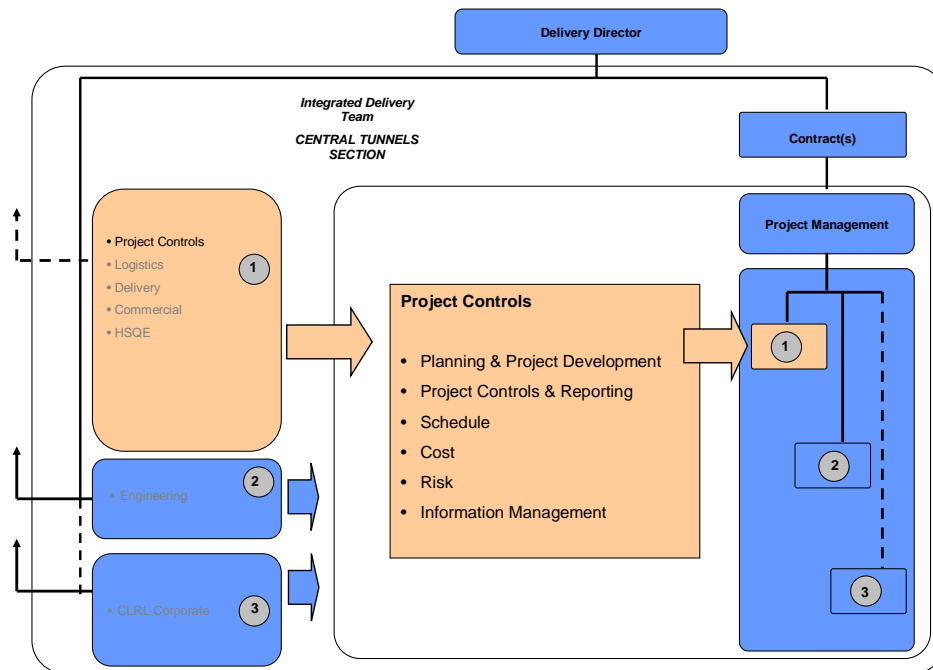
The charts indicate those areas of the Central Section Project delivery team which are expected to be resourced by CLRL, those areas which it is anticipated the Project Delivery Partner will resource and those where a more integrated, “best fit” approach will be adopted. The scope of services for the Project Delivery Partner is set out in Part 2 of the respective ITT.



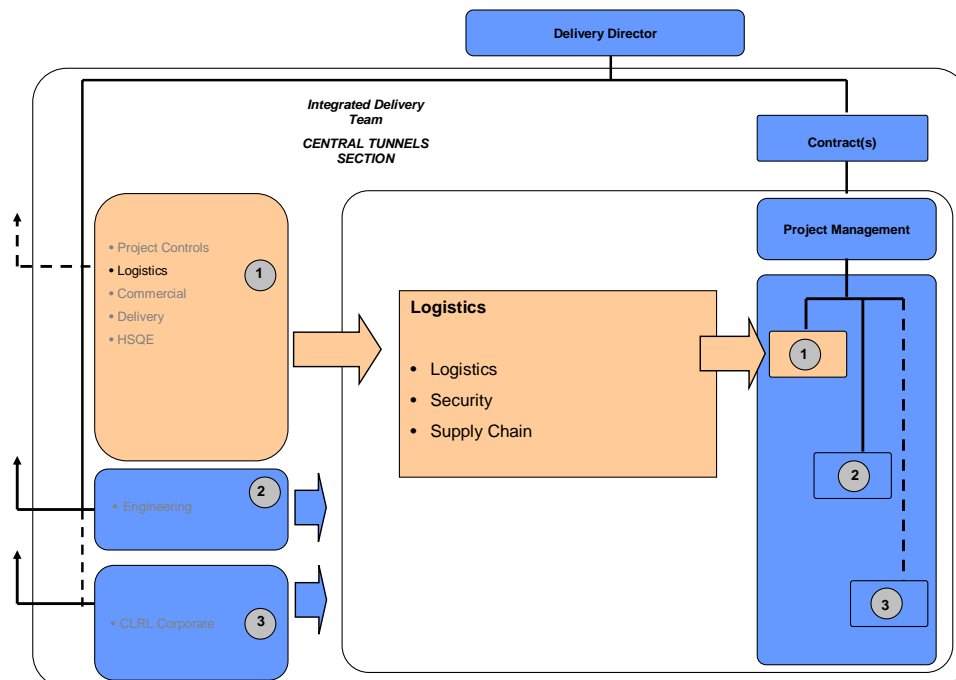
D.1 Central Section Project



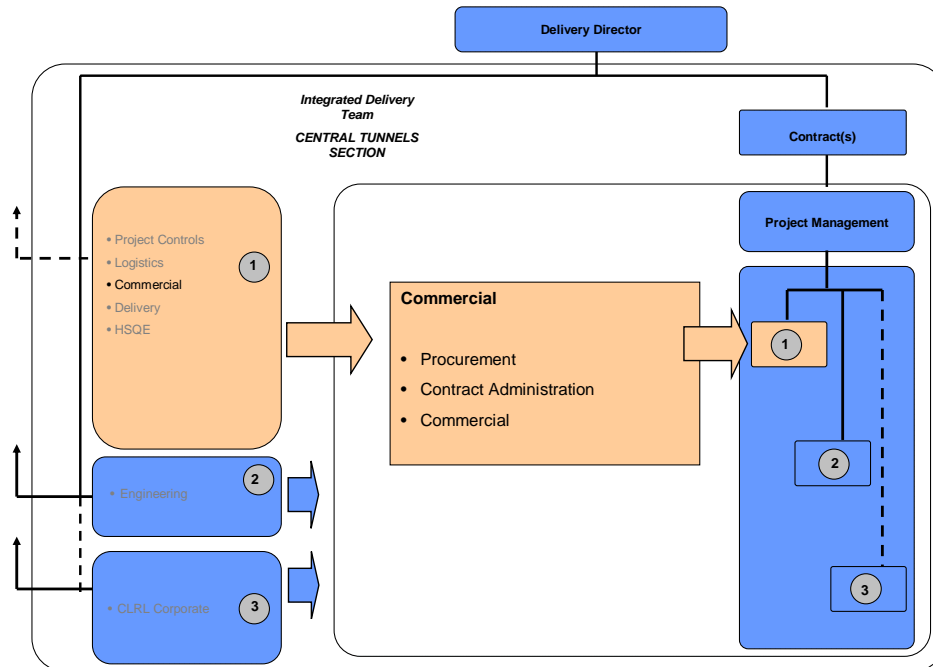
D.2 Project Controls



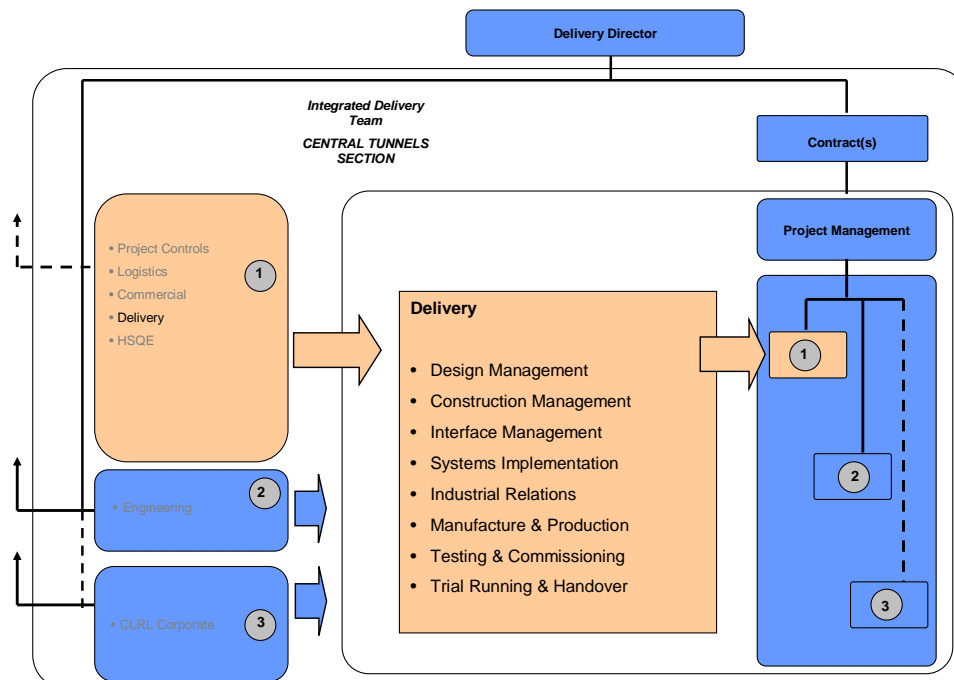
D.3 Logistics



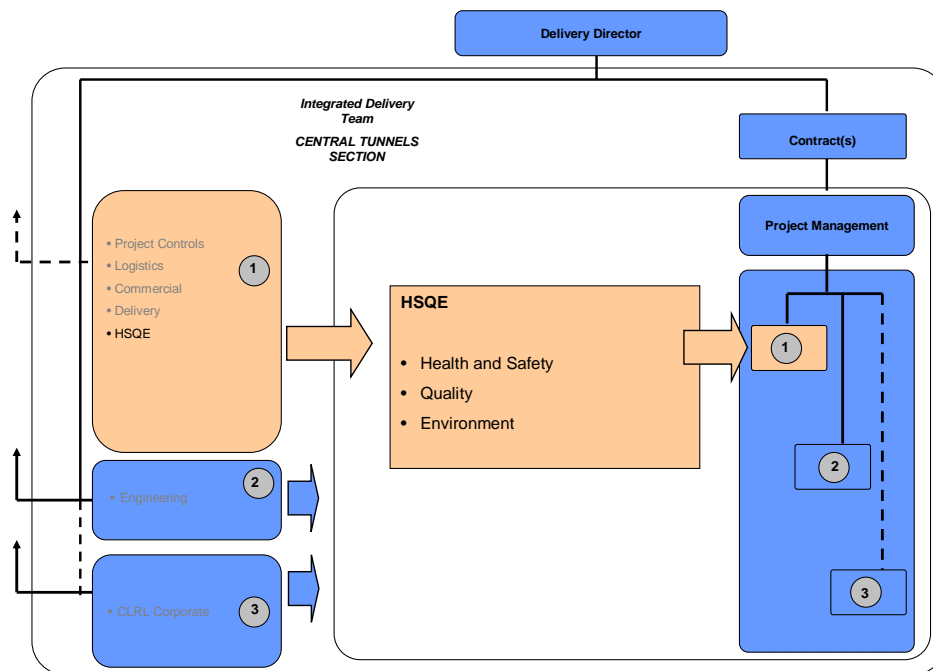
D.4 Commercial



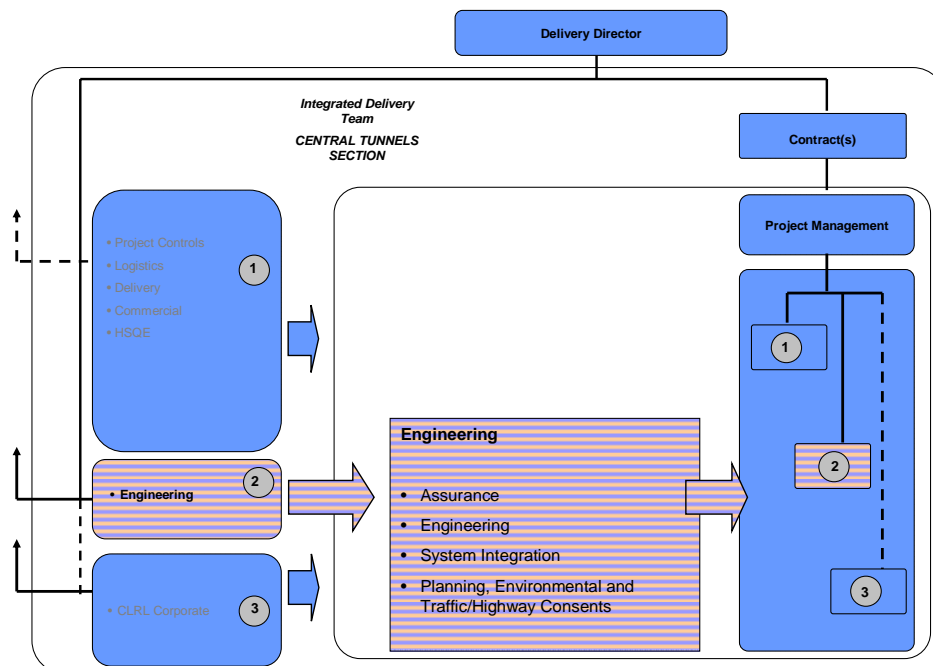
D.5 Delivery



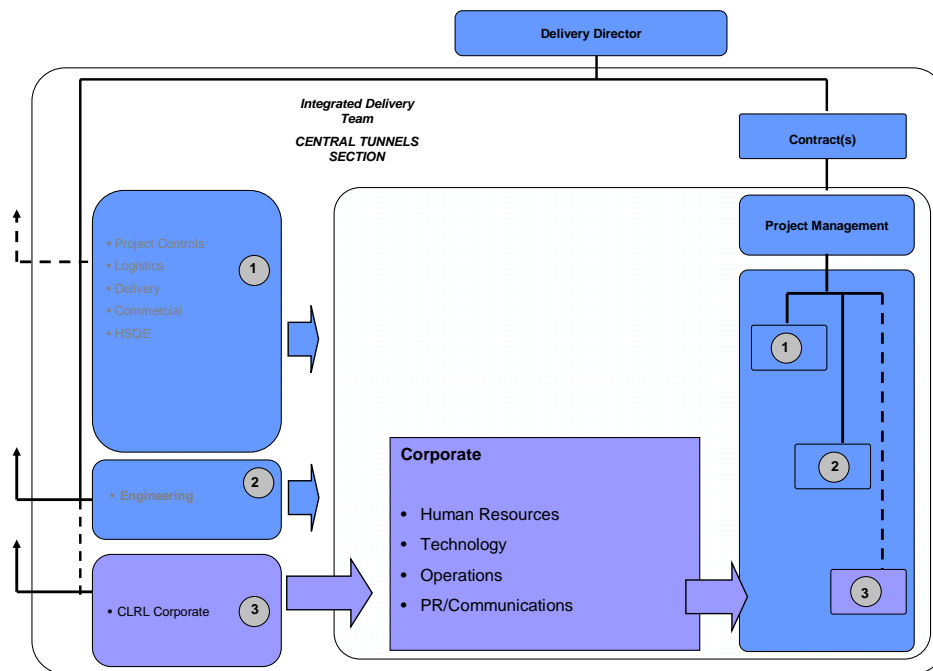
D.6 HSQE



D.7 Engineering



D.8 CLRL Corporate



Appendix E Indicative RACI Charts

The RACI charts included in this Appendix are provided for information purposes only and are intended to give an indication of how CLRL saw the allocation of roles within the integrated Programme team when this briefing material was prepared, as well as an indication of what roles would be conducted at a Project level by the Project Delivery Partner, the Design Framework Consultants, contractors and other supply chain partners. The scope of services for the Programme and Project Delivery Partners are set out in Part 2 of the respective ITT.

It is CLRL's intention that these charts are updated and further informed through the tender processes for the Programme Partner and Project Delivery Partner and that the charts are developed further as required by the programme management systems to be used on Crossrail. The RACI charts will not form part of the Programme Partner or Project Delivery Partner contracts. The RACI analyses responsibility for undertaking specified activities under the following headings:

- **Responsible** – This is the person or group responsible for performing a task, but who is not ultimately accountable. Responsibility can be shared and delegated.
- **Accountable** – This is the person who is held accountable for the task being completed, the person who is ultimately answerable for the activity or decision. Accountability can not be delegated but can be transferred through a formal contractual relationship.
- **Consulted** - These are the people communicated with prior to a task being performed. Essentially, their input is sought and factored in prior to any action and is based on two way communication.
- **Informed** - These are the parties who are notified about a task before, during or after it has been performed and is based on one way communication.

The charts also give a preliminary indication of the phase of the Programme in which an activity takes place:

- **Programme Definition** – The phase during which the Programme requirements are established, the governance framework is defined and put in place, the Programme team is formed for the delivery phases that follow and the Programme execution plan is first developed which details how the Programme will be implemented.
- **Design Development** - The phase during which the design is developed to a stage where it can be passed over to a contractor, either for further development (under a design and build contract) or for construction. In Crossrail's current strategy this phase would start on the award of Design Framework Consultants' agreements. The design development phase continues through the procurement and construction phases and involves non-design activities.
- **Procurement** - The phase during which contractors are procured to undertake construction or implementation. The phase involves non-procurement activities.
- **Construction** - The phase during which construction, implementation, test and commissioning and handover takes place. The phase involves non-procurement activities.

E.1 RACI – Directorate

Roles & Responsibilities		Indicative for Discussion				A = Accountable R = Responsible C = Consulted I = Informed				1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction			
Activity		Phase				Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties	
1	Programme Directorate	1	2	3	4								
1	1	Programme Definition											
		Programme financing & funding	1	2	3	4	A	R	I	I			
		Budget allocation & ownership	1	2	3	4		A, R	C	I	I		
		Expenditure control	1	2	3	4		A	R	C	C		
		Feasibility studies & alternatives analysis	1	2	3	4		A	R	C	R		
		Financial planning, cost estimating & value management	1	2	3	4		A, R	R	R	C	C	
		Requirements definition & objectives setting	1	2	3	4		A, R	C	I	I	I	C
		Programme wide strategies & management plans											
		Management processes	1	2	3	4		A	R	I			
		Roles & responsibilities	1	2	3	4		A	R	C	C		
		Reporting	1	2	3	4		A	R	C	C		
		Delivery organisation & strategies	1	2	3	4		A	R	I			
		Communication lines	1	2	3	4		A, R	C	C			
		Vision, values, objectives and culture	1	2	3	4		A, R	R	R	C	C	
		Requirements definition & scope management	1	2	3	4		A	R	C	I		
		Contract packaging	1	2	3	4		A, R	C	C			
		Commercial management - 3rd party agreements	1	2	3	4	Yes	A, R					R
		Implementation strategies											
		Delivery	1	2	3	4	Yes	A, R	I	I			
		Programme & Project Execution Plans	1	2	3	4		A, R	R	R			
		Logistics	1	2	3	4		A, R	C	C			
		Supply chain	1	2	3	4		A, R	C	C			
		Operations & maintenance	1	2	3	4		A, R	C	C			
		Testing & commissioning	1	2	3	4		A, R	C	C			
		Approvals & consents strategies	1	2	3	4		A, R	C	C	I	I	I
1	2	Legal & Government Sponsorship											
		Programme governance and sponsor agreements	1	2	3	4	Yes	A, R	I	I			
		Corporate secretariate	1	2	3	4		A, R	I	I			
		Corporate obligations eg freedom of information	1	2	3	4		A, R	I	I			
		Human resource issues	1	2	3	4		A, R					
		Procurement contracts	1	2	3	4		A, R	I	I			
		Insurance											
		Programme (Contractor's, Third Party, PI)	1	2	3	4		A, R	I	I			
		Corporate (Director's Third Party, Plant & Eqt etc)	1	2	3	4		A, R	I	I			
		Land acquisition											
		Compulsory purchase process & procedures	1	2	3	4		A, R	I	I			
		Compensation	1	2	3	4		A, R	I	I			
		Land tribunal	1	2	3	4		A, R	I	I			
		Legal challenges	1	2	3	4		A, R	I	I			
		Oversite development agreements	1	2	3	4		A, R	I	I			
		Construction related litigation											
		Conciliation	1	2	3	4		A, R	I	I			
		Dispute resolution	1	2	3	4		A, R	I	I			
		Operational Contracts	1	2	3	4		C	I	I			A, R
1	3	Financial Management											
		Treasury & Accounting	1	2	3	4	Yes	A, R					C
		Financial control	1	2	3	4		A, R	C	C			
		CLRL company secretariate	1	2	3	4		A, R					
		Programme and commercial insurance provisions	1	2	3	4		A, R	C	C			
		Contingency management	1	2	3	4		A, R	C	C			
		Cash flow management	1	2	3	4		A, R	C	C			
1	4	Public Consultation & Relations											
		Public relations	1	2	3	4		A, R	C	C	C	C	C
		Media relations & management	1	2	3	4		A, R	C	C			
		Stakeholder comms interface & management (NR, LU)	1	2	3	4		A, R	C	C			C
		Community relations											

RACI – Directorate (continued)

Roles & Responsibilities RACI Chart		Indicative for Discussion				A = Accountable R = Responsible C = Consulted I = Informed				1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction			
Activity	Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties					
Community relations framework	1 2 3 4		A, R	C	C	C	C	C					
Complaints system including ICC	1 2 3 4		A, R	C	C	C	C	C					
Helpdesk	1 2 3 4		A, R	I	I	I	I	I					
Information centres	1 2 3 4		A, R	C	C	C	C	C					
Residents forum(s)	1 2 3 4		A, R	C	C	C	C	C					
Internal communications													
Policy, strategy & programme wide	1 2 3 4		A, R	I	I								
Procurement support	1 2 3		A, R	I	I								
Planning & consents support	1 2		A, R	I	I								
Delivery support	1 2 3 4		A, R	C	C								
Communications strategy & escalation strategy	1 2 3 4		A, R	I	I	I	I	I					
Emergency response strategy	1 2 3 4		A, R	C	C		C	C					
Political affairs plan	1 2 3 4		A, R	I	I	I	I	I					
1 5 Land & Property													
Land acquisition & agreements, including oversite	1 2		A, R	I	I	I	I	I					
Land access licences, consents and agreements	1 2 3 4		A, R	I	I	I	I	I					
Scheme integration based on third party undertakings	1 2 3 4		A, R	I	I	I	I	I					
Petitions, undertakings & assurances	1 2 3 4		A, R	I	I	I	I	I					
Planning consents & approvals	1 2 3 4		A	R	R	C	C	C					
1 6 Technology													
Business continuity & emergency planning	1 2 3 4		A, R	C	C	I	I	I					
Programme office, equipment & facilities management	1 2 3 4		A, R	C	C	I	I	I					
Project office, equipment & facilities management	1 2 3 4		A	C	R	I	I	I					
Programme IT services management	1 2 3 4		A, R	R	C	I	I	I					
Project IT services management	1 2 3 4		A	C	R	I	I	I					
1 7 Human Resources & Office Management													
Human resources policy & strategy													
Employment policy	1 2 3 4		A, R	I	I	I	I	I					
Employment conditions	1 2 3 4		A, R	I	I	I	I	I					
Organisational evolution	1 2 3 4		A, R	C	C	C	C	C					
Third party integration	1 2 3 4		A, R	R	R	C	C	C					
Human resources management													
CLRL - staff recruitment & management	1 2 3 4		A, R										
DP - staff recruitment & management	1 2 3 4		C	A, R	A, R								
Supply chain - staff recruitment & management	1 2 3 4		C	C	C	A, R	A, R						
Skills & training, including academies	1 2 3 4		A, R	R	R		C	R					
Industrial relations													
Development of strategy	2 3 4		A, R	C	I		I	C					
Application of strategy	3 4		A	C	R		C	C					
Implementation of strategy	4		A	C	C		R	C					
Occupational health & welfare													
CLRL staff & programme management office	1 2 3 4		A, R										
Programme Delivery Partner staff	1 2 3 4		C	A, R									
Project Delivery Partner staff & project offices	1 2 3 4		C	C	A, R								
Supply chain staff & offices	1 2 3 4		C	C	C	A, R	A, R						
2 Operations Management													
Crossrail Project Functional Requirements (CPFR)	1 2 3 4		A, R	R	C	I	I	C					
Operating Strategies													
Train Services Strategies	1 2 3 4		A, R	R	C	I	I	R, C					
Depot Strategy	1 2 3 4		A, R	R	C	I	I	C					
Command Control Strategy	1 2 3 4		A, R	R	C	I	I	R, C					
Safety & Security Strategies (Incl. Safety Case)	1 2 3 4		A, R	R	C	I	I	R, C					
Station Operations and Control Strategy	1 2 3 4		A, R	R	C	I	I	R, C					
Maintenance Strategy	1 2 3 4		A, R	R	C	I	I	R, C					
Systems Strategy	1 2 3 4		A, R	R	C	I	I	C					
Opening Strategy	1 2 3 4		A, R	R	C	I	I	R, C					
Commercial - retail / ticketing strategy	1 2 3 4		A, R	R	I	I		R, C					
Railway Specification Committee	1 2 3 4		A, R	R	I	I		R, C					
Change adoption													

RACI – Directorate (continued)

Roles & Responsibilities RACI Chart										A = Accountable				1 = Scheme Definition													
										R = Responsible				2 = Design Development													
										C = Consulted				3 = Construction Procurement													
Indicative for Discussion										I = Informed				4 = Construction													
Activity										Phase				Board Approval		CLRL Employer		Programme Delivery Partner		Project Delivery Partner		Designers		Contractors		Third Parties	
			Change control	1	2	3	4			A, R	R	I	I												C		
			Investment committee	1	2	3	4			A, R	R	I	I												C		
			Revisions to CPFR	1	2	3	4			A, R	C	I	I												C		
			Operational Cost Model	1	2	3	4			A, R	R	C	I	I											C		
			Maintenance Cost Model	1	2	3	4			A, R	R	C	I	I											C		

RACI – HSQE (continued)

Roles & Responsibilities RACI Chart					A = Accountable R = Responsible C = Consulted I = Informed		1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction						
Indicative for Discussion													
Activity					Phase		Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties

E.3 RACI – Controls

<div> <div>Roles & Responsibilities</div> <div>RACI Chart</div> <div>Indicative for Discussion</div> </div>									
<div> <div>A = Accountable</div> <div>R = Responsible</div> <div>C = Consulted</div> <div>I = Informed</div> </div>									
<div> <div>1 = Scheme Definition</div> <div>2 = Design Development</div> <div>3 = Construction Procurement</div> <div>4 = Construction</div> </div>									
Activity	Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties	
	1 2 3 4								
4									
4 1									
Programme Controls Management									
Programme Controls									
Crossrail Implementation plan	1 2		A, R	C	C	I	I	I	
Crossrail master schedule	1 2 3 4		A	R	C	C	C	C	
Programme programming software & protocols	1 2		A, R	C	I	I	I	I	
Work break down structure	1 2		A, R	C	I	I	I	I	
Procurement programme	1 2		A, R	C	C	I	I	I	
Planning programme level									
Phasing	2 3		A	R	C		I	I	
Advanced purchase	2 3		A	R	C		I	I	
Access & works areas	2 3		A	R	C		I	I	C
Site planning & co-ordination	2 3		A	R	C		I	I	
Traffic management	2 3		A	R	C	C	I	I	C
Utility diversions	2 3		A	R	C	C	I	I	C
Other enabling works	2 3		A	R	C	C	I	I	
Resource forecasting	2 3		A	R	C	C	C	C	
Logistics park requirements	2 3		A	R	C	I	I	I	C
Design programme	2 3		A	R	C	C	I	I	C
Construction programme	2 3 4		A	R	C	I	C	C	
Logistics	2 3								
Supply chain management (materials/labour)	2 3		A	R	C	C	C	C	
Construction waste disposal (incl contaminated)	2 3		A	R	C	C	C	C	C
Disposal of suitable material	2 3		A	R	C	C	C	C	C
4 2									
Central Section Project Controls									
Project Implementation plan	1 2		A, R	C	R	I	I	I	
Project master schedule	1 2 3 4		A	C	R	C	C	C	
Project programming software & protocols	1 2		A, R	C	C	I	I	I	
Project work break down structure	1 2		A, R	C	C	I	I	I	
Project procurement programme	1 2		A	C	R	I	I	I	
Project Planning	2 3								
Phasing	2 3		A	C	R		I	I	
Advanced purchase	2 3		A	C	R		I	I	
Access & works areas	2 3		A	C	R		I	I	
Site planning & co-ordination	2 3		A	C	R		I	I	
Traffic management	2 3		A	C	R	C	I	I	
Utility diversions	2 3		A	C	R	C	I	I	C
Other enabling works	2 3		A	C	R	C	I	I	
Resource forecasting	2 3		A	C	R	C	C	C	
Logistics park requirements	2 3		A	C	R	I	I	I	
Project design programme	2 3		A	C	R	C	I	I	
Project construction programme	2 3 4		A	C	R	I	C	C	
Project Logistics	2 3								
Supply chain management (materials/labour)	2 3		A	C	R	C	C	C	
Construction waste disposal (incl contaminated)	2 3		A	C	R	C	C	C	
Disposal of suitable material	2 3		A	C	R	C	C	C	
4 3									
Cost Control									
Crossrail budget management	1 2 3 4		A, R	I	I				
Crossrail cost management	1 2 3 4		A	R	C				
Crossrail contingency	4		A, R	C	C				
Contract control charges		4	A	C	R				
Contra charges		4	A	C	R	I	I		
Interim payments		4	A	C	R		C		
4 4									
Trend & Change Control									
Trends authorisation	2 3 4		A	R	C	I			
Cost/benefit analysis for proposed changes	2 3 4		A, R	R	C	C	C		
Design contract change authorisation	2 3 4		A, R	C	C	I			
Works contract change authorisation	2 3 4		A, R	C	C		I		

RACI – Controls (continued)

Roles & Responsibilities RACI Chart			A = Accountable R = Responsible C = Consulted I = Informed				1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction							
Indicative for Discussion														
Activity			Phase				Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties	
4	5	Estimating												
		Methodology	1	2	3	4		A, R	C	C	C			
		Programme												
		Pre-tender estimates	1	2				A	R	C	R			
		Parallel tender estimates		2	3			A	R	C	R			
		Trend estimates		2	3	4		A	R	C	C	C		
		Value engineering estimates		2	3	4		A	R	C	C	C		
		Central Section Project												
		Pre-tender estimates	1	2				A	C	R	R			
		Parallel tender estimates		2	3			A	C	R	R			
		Trend estimates		2	3	4		A	C	R	C	C		
		Value engineering estimates		2	3	4		A	C	R	C	C		
4	6	Risk Management												
		Risk management												
		Policy statement	1	2				A, R	I	I				
		Risk framework & organisation	1	2				A, R	C	C	I	I		
		Risk identification, assessment & response	1	2	3	4		A, R	R	R	C	C		
		Risk monitoring, records and mitigation	1	2	3	4		A	R	R	R	R		
		Reported damage to third party property				4		A	R	R	C	R		
		Programme Insurance												
		Professional indemnity insurance	1	2	3	4		A, R	I	I				
		Claims procedure (contractors, third parties)	1	2	3	4		A, R	C	C	I	I		
4	7	Reporting												
		Period (monthly, quarterly)	1	2	3	4		A, R	R	R	C	C	C	
		Board	1	2	3	4		A, R	C	C				
		Sponsors	1	2	3	4		A, R	C	C				
		Stakeholders (NR, LUL)	1	2	3	4		A	R	R	C	C		
		Programme logistics	1	2	3	4		A	R	R		C		
		Service & works contracts												
		Early warnings & compensation events status		2	3	4		A	R	R		C		
		Claims status		2	3	4		A	R	R		C		
		Progress meetings (monthly, quarterly)	1	2	3	4		A	R	R	C	C		
4	8	Value Management												
		Scope & programme	1	2				A	R	R				
		Functional analysis	1	2				A, R	R	R				
		Ideas (generation, evaluation)	1	2				A, R	R	R	R	R		
		Lifecycle cost benefit analysis	1	2				A	R	R	C	C		
4	9	Information Management												
		Strategy & management framework	1	2	3	4		A, R	C	C	I	I		
		Procedure development & management	1	2	3	4		A	R	R	I	I		
		Software selection, adoption and management	1	2	3	4		A	R	R	I	I		
		Document control	1	2	3	4		A	R	R	I	I		
		Technical library	1	2	3	4		A, R	C	C	I	I		
		Archival & retrieval	1	2	3	4		A	R	R	I	I		
		Geographical information system	1	2	3	4		A, R	C	C	I	I		
4	10	Contract administration oversight & disputes resolution												
		Contract Management												
		Contract management procedures & strategy				4		A	R	C				
		Programme oversight & project report review				4		A	R	C				
		Appointments & delegations				4		A	C	R				
		Inductions & training				4		A	C	R		C		
		Bonds, guarantees & undertakings				4		A	C	R		I		
		Contractor's insurances				4		A	C	R		C		
		Consents to sub-let				4		A	C	R		C		
		Nominated sub-contractors				4		A	C	R		C		
		Novation of sub-contracts				4		A	C	R		C		
		Milestone status reports				4		A	C	R		C		
		Collation of performance data				4		A	C	R		C		
		Improvement action plans				4		A	C	R		C		
		Extensions of time				4		A	C	R		C		

RACI – Controls (continued)

Roles & Responsibilities RACI Chart				<div> <div>A = Accountable</div> <div>R = Responsible</div> <div>C = Consulted</div> <div>I = Informed</div> </div> <div> <div>1 = Scheme Definition</div> <div>2 = Design Development</div> <div>3 = Construction Procurement</div> <div>4 = Construction</div> </div>				Indicative for Discussion			
Activity				Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties
			Completion & defects liability certification	4		A	C	R		C	
			Acceptance and takeover of entrusted (3rd party)	4		A	C	R		C	
			Administration of entrusted works	4		A	C	R		C	
			Claims & Dispute Management								
			Claims recording, assessment & reporting	4		A	C	R		I	
			Third party claims	4		A	C	R		C	C
			Employer's claims review	4		A	R	C		I	
			Referral to dispute review panel	4		A	R	C		I	
			Adjudication panel	4		A	R	C		I	
			Management of contra-charges	4		A	R	C		I	
			Payments								
			Contract control totals	4		A	C	R		I	
			Interim payments schedules (IPS)	4		A	C	R		I	
			Revisions to IPS & milestones	4		A	C	R		I	
			Retention management	4		A	C	R		I	
			Liquidated and general damages	4		A	R	C		I	
			Employers deductions	4		A	R	C		I	
			Contract Close Out								
			Agreement of Final Account	4		A, R	R	C		I	
			Approval of Final Payment	4		A, R	R	C		I	
			Conduct Contractors Performance Review	4		A, R	R	C		I	

E.4 RACI – Procurement

Roles & Responsibilities RACI Chart		A = Accountable R = Responsible C = Consulted I = Informed				1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction			
Indicative for Discussion									
Activity	Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties	
	1	2	3	4					
5	Procurement								
5 1	Procurement Policy & Management								
	Procurement plan requirements (A1)	1	2		Yes	A, R	I	I	
	Programme wide procurement strategy (A2)	1	2		Yes	A, R	I	I	
	Procurement procedures	1	2			A, R	I	I	
	Contract packaging strategy								
	Define	1	2		Yes	A, R	I	I	
	Review & Implement			3	4	A	C	R	
	Approve changes			3	4	Yes	A, R	C	C
	Standard forms of contract	1	2		Yes	A, R	I	I	
	Roles & responsibilities	1	2			A, R	I	I	
	Procurement scheduling & planning	1	2	3	4	A, R	C	C	
	Procurement Steering Group	1	2	3	4	A, R	C	C	
	Draft/submit papers for CLRL Board approval	1	2	3	4	A, R	C	C	
	Contract familiarisation & training			3	4	A, R	C	C	
	Contract policy & methodology			3	4	A, R	C	C	
	Review procedures & performance monitoring			3	4	A	R	R	C C
5 2	Design Framework Procurement								
	Market engagement	1	2			A, R			
	Assess and select tenderers (A3)	1	2			A, R			
	Publication of OJEU	1	2		Yes	A, R			
	Prequalification procedures	1	2			A, R			
	Approved list of tenderers	1	2			A, R			
	Produce invitation to Tender (A4)	1	2			A, R			
	Scope of services	1	2			A, R			
	Programme	1	2			A, R			
	Pricing schedule	1	2			A, R			
	Instructions for bidders/information documents	1	2			A, R			
	Evaluate Tenderers (A5)	1	2			A, R			
	Recommendation & Award Contract (A6)	1	2			A, R			I
	Performance monitoring	1	2			A, R	C	C	C
	Design mini-competitions			3	4	A	C	R	
	Scope of services			3	4	A	C	R	
	Programme			3	4	A	C	R	
	Pricing schedule			3	4	A	C	R	
	Instructions for bidders/information documents			3	4	A	C	R	
	Evaluation of bids			3	4	A	C	R	
	Negotiations, recommendations & final documentation			3	4	A	C	R	
	Approval to proceed & contract award			3	4	A, R			
5 3	Delivery Partner Procurement								
	Market engagement	1	2			A, R			
	Assess and select tenderers (A3)	1	2			A, R			
	Publication of OJEU	1	2		Yes	A, R			
	Prequalification procedures	1	2			A, R			
	Approved list of tenderers	1	2			A, R			
	Produce invitation to Tender (A4)	1	2			A, R			
	Scope of services	1	2			A, R			
	Programme	1	2			A, R			
	Pricing schedule	1	2			A, R			
	Instructions for bidders/information documents	1	2			A, R			
	Tender Evaluation - stage 1 (A5)	1	2			A, R			
	Approval of short list	1	2			A, R			
	Tender Evaluation - stage 2 (A5)	1	2			A, R			
	Negotiation	1	2			A, R			
	Recommendation & Award (A6)	1	2		Yes	A, R	I	I	
	Performance monitoring	1	2			A, R	C	C	
5 4	Construction & Systems Procurement								
	Market engagement & analysis			3	4	A	C	R	
	Assess and select tenderers (A3)								

RACI – Procurement (continued)

Roles & Responsibilities RACI Chart			Indicative for Discussion		A = Accountable R = Responsible C = Consulted I = Informed		1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction	
Activity	Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties
Publication of OJEU	3		A	C	R			
Prequalification & assessment procedures	3		A, R	C	R			
Evaluation & recommendation	3		A, R	C	R			
Approve list of tenderers & tender invitation	3	Yes	A, R	C	C			
Produce invitation to Tender (A4)								
Programme wide systems Interface management	3 4		A	R	C	C		
Particular technical specifications	3 4		A	C	R	R		
Drawings	3 4		A	C	R	R		
Particular specification	3 4		A	C	R	C		
Pricing document	3 4		A	C	R			
Instructions for tenderers	3 4		A	C	R			
Data documents	3 4		A	C	R			
Tender Evaluation - stage 1 (A5)	3 4		A, R	C	R			
Approval of short list	3 4		A, R	C	R			
Tender Evaluation - stage 2 (A5)	3 4		A, R	C	R			
Negotiation	3 4		A, R	C	R			
Recommendation & Award (A6)	3 4	Yes	A, R	C	R			
Feedback to tenderers	3 4		A, R	C	R			
Performance monitoring	3 4		A	C	R		C	
5 5 Other Procurements								
Enabling works management	2		A	C	R	C		
Survey & monitoring frameworks (settlement, noise etc)	2		A	C	R	C		
Geotechnical investigation frameworks	2		A	C	R	C		
Site clearance contracts	2		A	C	R	C		
Logistics contracts (eg TBMs, tunnel segments)	2		A	C	R			
Rolling stock & depot (DBFO) procurements	2 3 4	Yes	A, R	R	C	C		R
Advanced purchase procurement	3 4		A, R	R	C	C	C	
Central purchasing	3 4		A, R	R	C			

RACI – Engineering (continued)

Roles & Responsibilities RACI Chart				A = Accountable R = Responsible C = Consulted I = Informed				1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction			
Indicative for Discussion											
Activity				Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties
			DLR	1 2		A	I	I	R		C
			Third Party Works (Design Execution)								
			Utility Diversions	1 2		A	C	R	R		A, R
			Isle of Dogs Station (CWG)	1 2		A	I	I	C		A, R
			Woolwich Station (Berkeley Homes)	1 2		A	I	I	C		A, R
			On-Network Works (NR)	1 2		A	I	I	C		A, R
			London Underground Works (LU)	1 2		A	I	I	C		A, R
			DLR	1 2		A	I	I	C		A, R
			Depot								
			Engineering Management	1 2		A	I	I	R	C	
			Design Execution	1 2		A	I	I	R	R	
			Rolling Stock								
			Engineering Management	1 2		A	I	I	R	C	
			Design Execution	1 2		A	I	I	R	R	
			CDM	1 2		A	I	I	R	A, R	A, R
6	6		Consents - Planning, Environment, Traffic								
			Environmental management								
			Compliance with EMS	1 2 3 4		A	R	R	R	C	C
			Environmental audit	1 2 3 4		A	R	R	C	C	C
			Environmental performance management	1 2 3 4		A	R	R	C	C	C
			Training	2 3 4		A	R	R	C	C	C
			Consents programme & register	2 3 4		A	C	R	C	C	C
			Consultations with approval authorities	2 3 4		A	C	R	R	C	C
			Consents submissions	2 3 4		A	C	R	R	C	C
			Planning & consents								
			Consents programme & register	2 3 4		A	C	R	C	C	C
			Training	2 3 4		A	C	R	C	C	C
			Building, heritage and conservation requirements	2 3 4		A	C	R	C	C	C
			Consultations with approval authorities	2 3 4		A	C	R	R	C	C
			Consents submissions	2 3 4		A	C	R	R	C	C
			Highways & traffic management orders								
			Consents programme & register	2 3 4		A	C	R	C	C	C
			Training	2 3 4		A	C	R	C	C	C
			Consultations with approval authorities	2 3 4		A	C	R	R	C	C
			Consents submissions	2 3 4		A	C	R	R	C	C
			Archaeological management	2 3 4		A, R	C	R	C	C	C
			Discharge of third party undertakings and assurances	3 4		A	R	R	C	C	C
6	7		Detailed Design								
			Engineering management of CSP detailed design (excluding Third Party Works)	3 4		A	C	R	C	I	
			Execution of CSP detailed design (excluding Third Party Works)	3 4		A	C	C	R	I	
			Interface management to achieve programme	3 4		A, R	R	R	C	I	
			Integration of the CSP	3 4		A, R	R	R	C	I	
			Over Site Developments								
			Engineering Interface Management	2 3 4		A	I	R	C	I	
			Design Execution (Collaborative)	3 4		C	C	I	I	I	A, R
			Design Execution (Non-collaborative)	3 4		A	C	R	C	I	
			Third Party Works (Engineering Management)								
			Utility Diversions	2 3 4		A, R	R	R	R	I	R
			Isle of Dogs Station (CWG)	2 3 4		A, R	R	C	C	I	C
			Woolwich Station (Berkeley Homes)	2 3 4		A, R	R	C	C	I	C
			On-Network Works (NR)	2 3 4		A, R	R	C	C	I	C
			London Underground Works (LU)	2 3 4		A, R	R	R	C	I	C
			DLR	2 3 4		A, R	R	C	C	I	C
			Third Party Works (Design Execution)								
			Utility Diversions	2 3 4		C	C	C	C	C	A, R

Roles & Responsibilities RACI Chart				A = Accountable		R = Responsible		C = Consulted		I = Informed		1 = Scheme Definition		2 = Design Development		3 = Construction Procurement		4 = Construction	
Indicative for Discussion																			
Activity				Phase		Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties							
			Isle of Dogs Station (CWG)	2	3	4		C	C	C	C	C						A, R	
			Woolwich Station (Berkeley Homes)	2	3	4		C	C	C	C	C						A, R	
			On-Network Works (NR)	2	3	4		C	C	C	C	C						A, R	
			London Underground Works (LU)	2	3	4		C	C	C	C	C						A, R	
			DLR	2	3	4		C	C	C	C	C						A, R	
			Depot																
			Engineering Management	2	3	4		A, R	R	C	C	C							
			Design Execution	2	3	4		A	C	C	R	R							
			Rolling Stock																
			Engineering Management	2	3	4		A, R	R	C	C	C							
			Design Execution	2	3	4		A	C	C	R	R							
			CDM	3	2	3	4		A, R	R	R	A, R	A, R					A, R	
6	8		Design Review & Approvals																
			Programme level systems integration	2	3	4		A	R	C	C	C							
			Designers' assurance	2	3	4		I	I	I	A, R	C							
			Supply of independent technical certification	2	3	4		A	C	C	R	C						C	
			Design review	2	3	4		A, R	R	R	C	C							
			Design approval	2	3	4		A, R	C	C	C	C							
			Compliance with interoperability regulations		3	4		A	R	R	C	C							

E.6 RACI – Delivery

Roles & Responsibilities RACI Chart					A = Accountable R = Responsible C = Consulted I = Informed		1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction									
Indicative for Discussion																
Activity					Phase				Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties	
					1	2	3	4								
7				Delivery												
7	1			Policy, plans & procedures												
				Pre-construction plans												
				Definition of delivery organisation & comms lines		2	3			A	R	C				
				Roles & responsibilities for delivery team		2	3			A	R	C				
				Validation of design/construction sequencing		2	3			A	R	R	C			
				Constructability reviews		2	3			A	R	R	C			
				Tender documents reviews		2	3			A	R	R				
				Assistance with tender assessment		2	3			A	R	R				
				Supervision of surveys and investigations		2	3			A	C	R	C			
				Development of industrial relations strategy		2	3	4		A, R	C	I		I		C
				Construction plans & procedures												
				Site surveillance		2	3			A	R	C	C			
				Review of contractors' submissions		2	3			A	R	C	C			
				Contract administration		2	3			A	R	C				
				Planning & scheduling		2	3			A	R	C	C			
				Reporting		2	3			A	R	C				
				Health & Safety		2	3			A	R	C	C			
				Quality systems		2	3			A	R	C	C			
				Environmental		2	3			A	R	C	C			
				Design management		2	3			A	R	C	R			
				Interface management strategy												
				Stakeholder interface & requirements		2	3			A	R	R				C
				Co-ordinated construction programme		2	3			A	R	R				C
				Co-ordinated construction drawings		2	3			A	R	R	C			
				Structural, electrical & mechanical drawings		2	3			A	R	R	C			
				Consents management												
				Environmental management												
				Compliance with EMS		2	3	4		A	C	R		R		
				Environmental audit		2	3	4		A	C	R		R		
				Environmental performance management		2	3	4		A	C	R		R		
				Training		2	3	4		A	C	R		R		
				Consents programme & register		2	3	4		A	C	R		R		C
				Consultations with approval authorities		2	3	4		A	C	R		R		C
				Consents submissions		2	3	4		A	C	R		R		C
				Planning & consents												
				Management of consents, programme level		2	3	4		A	R					
				Management of consents, CTS project level		2	3	4		A		R				
				Discharge of design planning consents		2	3	4		A			R			C
				Discharge of construction planning consents		2	3	4		A				R		C
				Highways & traffic management orders												
				Production of TMP/GTP		2	3	4		A	C	R		R		
				Establish & attend TLG		2	3	4		A	C	R		R		C
				H&T submissions		2	3	4		A	C	R		R		C
				Public consultations		2	3	4		A	C	R		R		C
				Consents programme & register		2	3	4		A	C	R		R		C
				Audit		2	3	4		A	C	R		R		
				Consultations with approval authorities		2	3	4		A	C	R		R		C
				Consents submissions		2	3	4		A	C	R		R		C
				Traffic management methodology		2	3	4		A	C	R		R		C
				Archeological management		2	3	4		A	C	R		R		C
				Discharge of third party undertakings and assurances		2	3	4		A	C	R		R		C
7	2			Stations & Tunnels												
				Design management												
				Paddington Station		2	3			A	C	R	C			
				Bond Street Station		2	3			A	C	R	C			
				Tottenham Court Road Station		2	3			A	C	R	C			
				Farringdon Station		2	3			A	C	R	C			
				Liverpool Station		2	3			A	C	R	C			
				Whitechapel Station		2	3			A	C	R	C			
				Tunnels, shafts and portals (west)		2	3			A	C	R	C			
				Tunnels, shafts and portals (east)		2	3			A	C	R	C			
				Isle of Dogs		2	3			A	C	C				R
				Woolwich Station		2	3			A	C	C				R
				On Network Works		2	3			A	C	C				R
				London Underground Interface Works		2	3			A	C	C				R

RACI – Delivery (continued)

Roles & Responsibilities RACI Chart					A = Accountable R = Responsible C = Consulted I = Informed		1 = Scheme Definition 2 = Design Development 3 = Construction Procurement 4 = Construction	
Indicative for Discussion								
Activity	Phase	Board Approval	CLRL Employer	Programme Delivery Partner	Project Delivery Partner	Designers	Contractors	Third Parties
Construction management								
Paddington Station			A	C	R		C	
Bond Street Station			A	C	R		C	
Tottenham Court Road Station			A	C	R		C	
Farringdon Station			A	C	R		C	
Liverpool Station			A	C	R		C	
Whitechapel Station			A	C	R		C	
Tunnels, shafts and portals (west)			A	C	R		C	
Tunnels, shafts and portals (east)			A	C	R		C	
Isle of Dogs	2 3		A	C	C			R
Woolwich Station	2 3		A	C	C			R
On Network Works	2 3		A	C	C			R
London Underground Interface Works	2 3		A	C	C			R
Construction - all CLRL sites			C	C	C		A, R	R
Construction - all third party sites			C	C	C			A, R
Contracts interface management			A	C	R		R	R
7 3 Systems								
Design specification management								
Building services	2 3		A	C	R	C		
Railway systems	2 3		A	R	C	C		R
Rolling stock	2 3		A	R	C	C		R
Maintenance depot	2 3		A	R	C	C		R
Isle of Dogs	2 3		A	C	C			R
Woolwich Station	2 3		A	C	C			R
On Network Works	2 3		A	C	C			R
London Underground Interface Works	2 3		A	C	C			R
Design & construction management								
Building services			A	C	R		C	
Railway systems			A	R	C		C	R
Rolling stock			A	R	C		C	R
Maintenance depot			A	R	C		C	R
Isle of Dogs	2 3		A	C	C			R
Woolwich Station	2 3		A	C	C			R
On Network Works	2 3		A	C	C			R
London Underground Interface Works	2 3		A	C	C			R
Design & construction - systemwide			A	C	C		R	R
7 4 Interface Management								
Railway & regulatory interfaces								
Network Rail	1 2 3 4		A	R	R			C
London Underground	1 2 3 4		A	R	R			C
Docklands Light Rail	1 2 3 4		A	R	R			C
BAA	1 2 3 4		A	R	C			C
Compliance & Assurance Group	2 3 4		A	R	R			C
HMRF	1 2 3 4		A	R	R			C
Railway possessions	1 2 3 4		A	R	R			C
Rolling stock contractor			A	R	C			C
LFEPA	1 2 3 4		A	R	R			C
City of London	1 2 3 4		A	R	R			C
British Transport Police	1 2 3 4		A	R	R			C
Third party developers								
Isle of Dogs	1 2 3 4		A	R	I			C
Woolwich	1 2 3 4		A	R	I			C
Custom House	1 2 3 4		A	R	I			C
Property developers	1 2 3 4		A	R	I			C
Retailers	1 2 3 4		A	R	I			C
Enabling works								
Utilities, traffic diversions, demolition			A	C	R		R	R
Liaison with authorities								
Local authorities, Emergency Services	1 2 3 4		A	C	R			C
Highways Agency	1 2 3 4		A	C	R			C
7 5 Testing & Commissioning								
Systems testing and commissioning								

[illegible]



Crossrail

