



# PROGRAMME DIRECTORATE

## Crossrail Project Handover Strategy & Plan Central Operation Section

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Revision	Status / Description of Changes
1.0	Document fully revised to incorporate comments
2.0	Document fully revised to incorporate comments
3.0	Document fully revised to incorporate comments
4.0	Document revised to incorporate updates on Element definitions, interim acceptance, surface handover and legal terminology
5.0	Updated to align with the Earliest Opening Programme and the amended Handover Strategy including Staged Completion
6.0	Updated for the 2020/21 Programme Delivery Plan

## Contents

<b>1</b>	<b>Purpose</b> .....	<b>5</b>
<b>2</b>	<b>Overview</b> .....	<b>5</b>
2.1	Pathway to Completion .....	6
2.2	The approach to completing the Routeway .....	9
2.3	The approach to completing the stations .....	10
2.4	Project Development Agreement Requirements on Handover .....	10
<b>3</b>	<b>Achieving Handover of the railway</b> .....	<b>11</b>
3.1	Handover Requirements .....	12
3.2	Elements .....	12
3.3	CRL Project Works.....	14
3.4	On Network Works .....	14
<b>4</b>	<b>Programme Delivery Plan</b> .....	<b>14</b>
4.1	Trial Running.....	14
4.2	Railway Systems Trial Operations .....	15
4.3	Station Staged Completion (SC3ROGS) – Station Trial Operations .....	16
<b>5</b>	<b>Element Handover approach</b> .....	<b>16</b>
5.1	Railway Systems, Non-Traction Power and Routeway Civils Elements.....	16
5.2	Communications and Control Assets/Systems .....	17
5.3	Handover of Shafts, Portals and Custom House Station .....	18
5.4	Plumstead Maintenance Facility and Stabling Sidings .....	18
<b>6</b>	<b>Handover Process</b> .....	<b>19</b>
6.1	Accountabilities .....	19
6.2	Element Outstanding Works .....	19
6.3	Safety Justification Strategy.....	19
6.4	Handover Execution Plan.....	20
6.5	T-Minus Stage Gate Process.....	20
6.6	Regulatory Approvals.....	20
<b>7</b>	<b>The Requirements of Handover</b> .....	<b>21</b>
7.1	Change of Responsibilities and Accountabilities .....	21
7.2	Transfer of Handover Documentation.....	22
7.3	Agreements.....	23
7.4	Works Completion.....	25
7.5	Training is in place .....	26
7.6	RFLI, MTR[C], LU and NR Readiness .....	26
7.7	Spares and Equipment.....	28
7.8	Warranties and Defect Liabilities.....	29
7.9	Project Information Migration .....	29
<b>8</b>	<b>Handover of Other Elements and Project Works</b> .....	<b>31</b>
8.1	Interface Works .....	31
8.2	Works delivered by TfL PFIs & Pan-TfL Contracts .....	32
8.3	Works delivered by NR .....	33
8.4	South-East Spur and Abbey Wood Station.....	34
8.5	Rolling Stock and Depots.....	35
8.6	Land and Property.....	36
<b>Appendix 1 – Reference Documents</b> .....		<b>38</b>
<b>Appendix 2 – Handover Definitions</b> .....		<b>40</b>
<b>Appendix 3 – Elements to Contracts</b> .....		<b>43</b>
<b>Appendix 4 – Crossrail Handover Scope Map</b> .....		<b>45</b>

# 1 Purpose

The purpose of the Handover Strategy and Plan is to outline the programme approach and describe the delivery detail for the successful transfer of the Crossrail Project Elements to the relevant Infrastructure Managers (IMs) in line with the Crossrail Project Development Agreement (PDA). Successful transfer is defined as delivering the Central Operating Section (COS) to Revenue Service as early as possible with a plan in place to complete any outstanding works.

A key event in this strategy is the transfer of the Railway to Rail for London Infrastructure (RFLI) which will allow RFLI to stand up as an Infrastructure Manager under the Railway and Other Guided Systems (ROGS) regulations. The focus of this revision are the steps to support entry into Trial Running in line with the Programme Delivery Plan.

It is anticipated that further revisions of this strategy and plan may be required to provide greater detail for entry into Trial Operations and Revenue Service.

# 2 Overview

The Crossrail Project is delivered by several organisations, including CRL and this document describes the approach to handover of those assets being delivered by CRL to the relevant IM. However, under the PDA clause 6.2 [Ref 23 Project Development Agreement], CRL also has responsibilities for overall programme management of the Project and therefore this plan also refers to assets being delivered and handed over by others - including LU and Network Rail - as set out below:

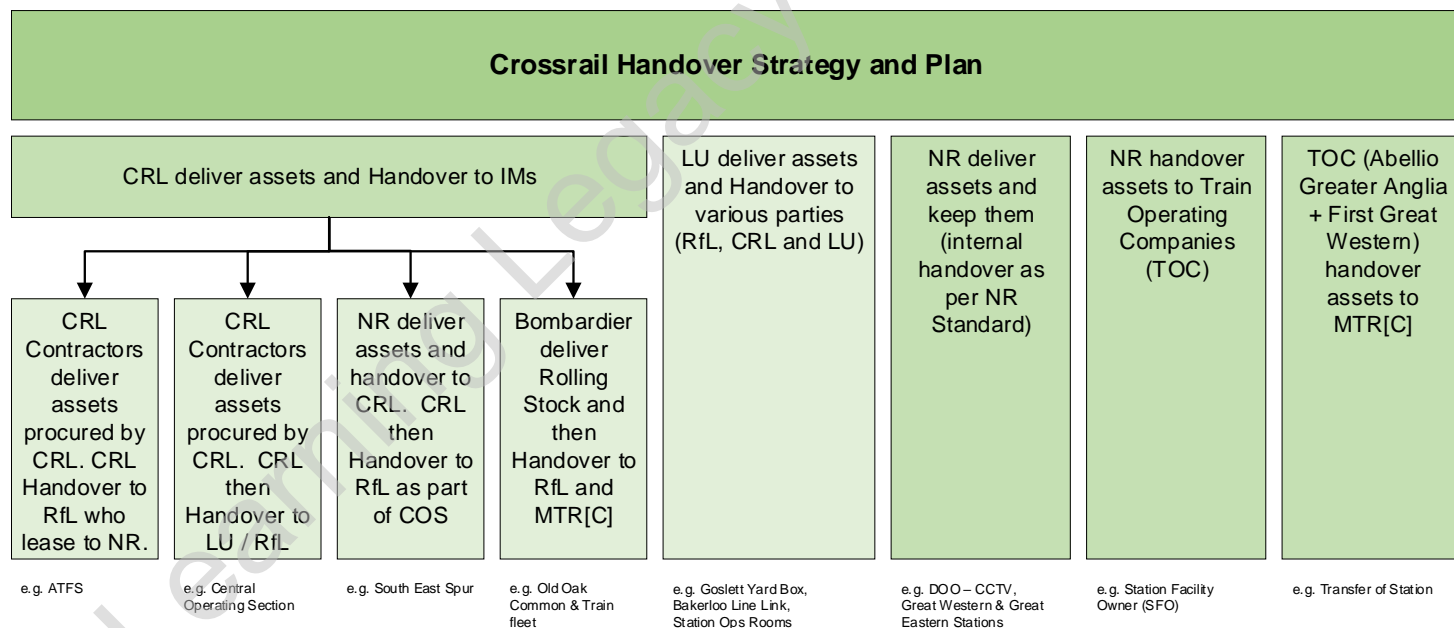


Figure 2.1: High-level representation of the scope included in this document.

It should be noted that this document does not cover:

- The transfer of safety accountability and facility management from RFLI to MTR Crossrail.
- Contractual takeover and completion of works by Contractors
- RFLI business readiness (although it does cover operational and maintenance readiness)
- RFLI and NR transfer of Station Facility Owner (SFO) accountability to MTR Crossrail
- Handover of CRL Project Works to third parties (non-railway organisations)
- Handover of Urban Realm Works to local authorities, or oversight developments to Developers
- Paddington New Yard (Lafarge Tarmac and Bus Deck)

- TfL marketing and communications strategy
- Crossrail Project Route Control Centre (RCC) at Romford – built and controlled by Network Rail, although this document does cover CRL's work within the RCC.

## 2.1 Pathway to Completion

In April 2019 CRL announced its strategy for Revenue Service known as the Earliest Opening Programme (EOP). The EOP was subsequently developed into the Delivery Control Schedule (DCS) and in September 2020 was further updated and confirmed as the Programme Delivery Plan. This document relates specifically to the commencement of the Central Operating Section Trial Running stage.

This revision of the Handover Strategy and Plan provides an update on the concepts introduced by the Earliest Opening Programme (EOP) and addresses the following:

- The progressive completion and Handover of systems, specifically the Communications & Control systems.
- The complexities of the train signalling interface
- The assurance burden productivity and its effect on the limited resources to review assurance
- The interface between the stations and the Routeway.

Completion of the railway will be progressive with stages in the Handover process until the Final End State condition when all works are done. There are five main configuration stages that must be prioritised and adhered to:

- Ready for Trial Running
- Ready for Station Trial Operations
- Ready for Routeway Trial Operations
- Ready for Revenue Service
- Final End State

To support planning for delivery of the assets required to be complete at each stage in the Handover process, several documents were produced to define the entry and exit criteria in the steps to Revenue Service. These documents are:

- CRL1-XRL-O7-RSP-CR001-50003 EOP Configuration States - SC1 SC2 SC3 Definition Paper
- CRL1-XRL-O8-STP-CR001-50157 Entry Exit Criteria Route Map
- CRL1-XRL-O8-STP-CR001-50162 Dynamic Testing Exit and Trial Running Entry Criteria
- CRL1-XRL-O8-STP-CR001-50163 Trial Running Exit and Trial Operations Entry Criteria
- CRL1-XRL-O8-STP-CR001-50164 Trial Operations Exit and Revenue Entry Criteria

Some of the definitions used for configuration states at the time the EOP was produced have subsequently changed. The current key definitions are confirmed as follows:

- **SC ROGS** is a configuration state of the routeway enabling Trial Running. Staged Completion of part of the routeway can occur once this is achieved, RFLI stands up as the IM and Routeway assets are transferred.
- **SC1** is a configuration state for a station that provides an emergency access and intervention route to the platform and supports Trial Running while the station remains a construction site. It is not a Staged Completion and no transfer of assets takes place.
- **SC2** is a configuration state for a station that provides more than one emergency access and intervention route to the platform and supports Trial Operations while the station remains a construction site. It is not a Staged Completion and no transfer of assets takes place.

- **SC3** is a milestone for a station that demonstrates that the scope of the station assets delivered by the Tier 1 Contractor are largely complete as verified by the PM. It is not a Staged Completion and no transfer of assets takes place. Considered as the milestone when the Tier 1 will substantially demobilise from site activities.
- **SC3 ROGS ASSURED** is a configuration state for a station when the Element is fully assured ready for transfer of the assets to the relevant IM in advance of the planned date for the staged completion. It will be typically four weeks in advance of the SC3 ROGS milestone date.
- **SC3 ROGS** is a staged completion milestone for a station at which transfer of assets to the relevant IM takes place under the Handover process.

The document currently being used to define and control the configuration state required for Trial Running is the Crossrail Entry into Trial Running System Description (eB reference and title CRL1-XRL-O8-RGN-CR001-50403 System Description for Entry in to Trial Running).

It is important to note that at any stage prior to Final End State the works will not be fully complete and that as IMs progressively take possession of assets, the completion of any outstanding works on or near those assets will require works processes to comply with IM rules for access. The constraints on the completion of works will increase over time as the railway moves from Trial Running to Revenue Service. As a result, in some cases, whilst operational responsibility will pass to the IM on transfer, maintenance may not. Should CRL be undertaking a significant volume of work on a system subsequent to the transfer to the Infrastructure Manager (such as on the SCADA system), both parties may agree it is more practicable for maintenance to remain with CRL (via its contractors) on an interim basis. If this applies details will be captured in relevant Handover Execution Plans (HEP).

An Element is a group of assets and/or systems for procuring Handover from CRL to the IM (see PDA Clause 16.2(a) and summary in section 3 of this document). Therefore, the use of the term Element is aimed at enabling Handover, and it is at the Element level that Handover activities will take place. The whole Railway will be covered by the Crossrail Engineering Safety and Assurance Case (CESAC).

The following table sets out the path to completion for the various Elements in accordance with the principles described in this document.

Element Type	Handover Status						
	Pre ROGS	At SC ROGS	Trial Running	Railway Trial Operations	Station Trial Operations	At Revenue Service	End State
Shafts, Portals & Custom House Station	(Premises) Handover	Handover					Handover
Railway Systems - PTI, Track, Energy (ind NTP), Tunnel Systems & Safety	Assured ready for ROGS	Staged Completion with transfer	Further Configuration	Handover			Handover
Railway Systems - Signalling, Comms & Control	Assured ready for ROGS	Staged Completion with transfer	Further Configuration	Further Configuration	Further Configuration	Handover	Handover
Routeway Civils	Assured ready for ROGS	Handover					Handover
Plumstead Maintenance Facility & Stabling Sidings	PMF Staged Completion with transfer	PSS Staged Completion with transfer	Handover				Handover
Stations - FAR	SC1 & SC3	Staged Completion SC3 ROGS	-	-	Handover		Handover
Stations - Other	SC1 & SC3	SC1 & SC3	Staged Completion SC3 ROGS	-	Handover		Handover
Stations - BOS	SC1	SC1	SC2	-	-	Staged Completion	Handover

Figure 2.2: Route to Handover

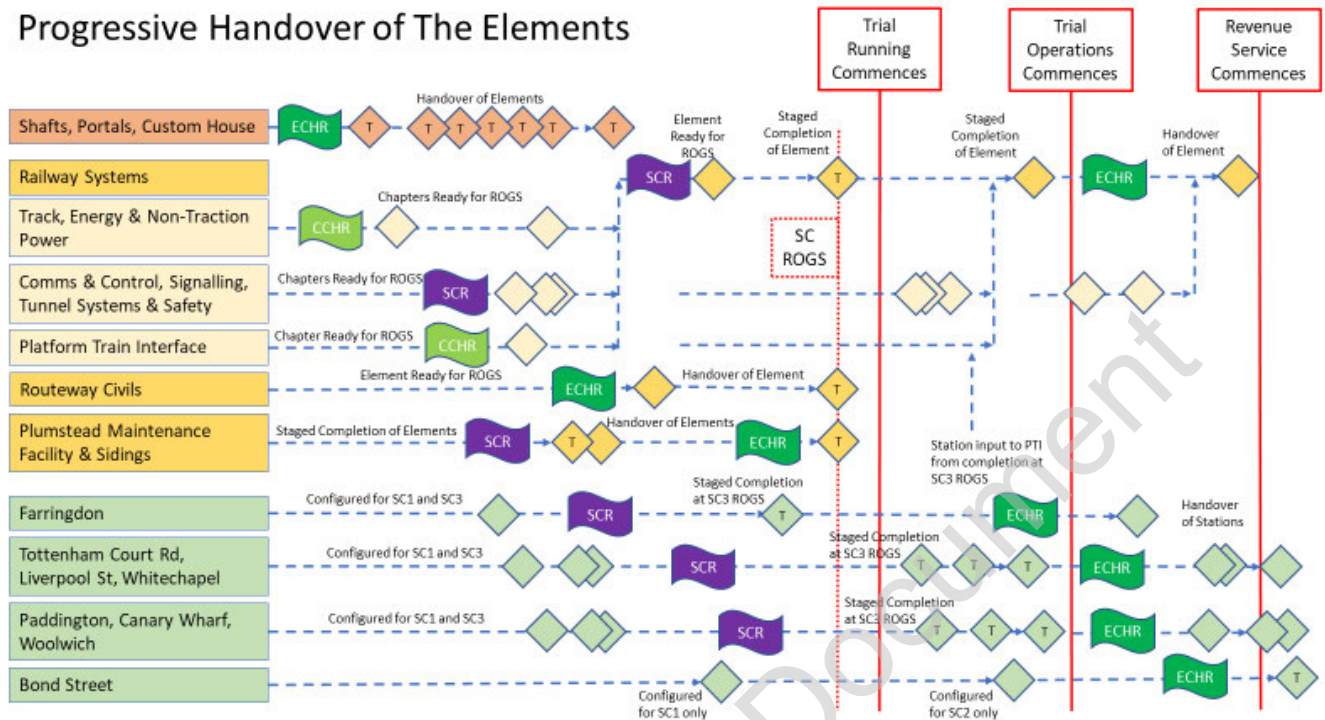
\*If SC3 ROGS has not been achieved at either BOS or WHI then Station Trial Operations will not commence at that station. Revenue Service can proceed without BOS and/or WHI. FAR Staged Completion is scheduled to take place before Trial Running starts but is not required as part of the configuration for entry into Trial Running.

The term banked is used to describe the submission and acceptance of associated documentation.

The below chart shows the sequence of the various activities.



## Progressive Handover of The Elements



**Figure 2.3: Sequence of Element Configuration, Staged Completion and Handover**

Please note this process chart is for guidance and should be tailored to suit specific Elements and captured in the Handover Execution Plan as required.

### 2.2 The approach to completing the Routeway

In order to commence Trial Running, RFLI must be authorised to do so under ROGS and for this purpose, care (including possession) of the Routeway (which is defined below) must be transferred from CRL to RFLI. RFLI will also have maintenance responsibility for the Routeway from that point.

The Routeway comprises of the following Elements –

- Railway Systems (Element No. 1)
- Non-Traction Power (Element No. 2)
- Routeway Civils (Element No. 3, previously called Tunnels and Structures)
- Plumstead Maintenance Facility (Element No. 4)
- Plumstead Sidings (Element No. 5)
- All Portals (Elements No. 6 to No. 10 inclusive)
- All Shafts (Elements No. 11 to No. 15 inclusive)

To ease the assurance process, the Railway Systems Element (Element No. 1) has been split into chapters but the assets will be transferred to the IM as one Element. The chapters are Track, Energy, Tunnels Systems & Safety, Communications and Control (C&C), Platform Train Interface and Signalling. Not all the chapters of this Element will be in their final state at the commencement of Trial Running and therefore there will be a Staged Completion for the Railway Systems Element. Responsibility for care and maintenance of this Element will be transferred to RFLI using the Staged Completion process at the SC ROGS milestone. Final Handover of the Railway Systems Element will occur only once the works associated with each of the chapters are in their final state.

Transfer of the Non-Traction Power, Routeway Civils, Plumstead Maintenance Facility and Plumstead Sidings Elements will be at the same SC ROGS milestone and responsibility for care and maintenance of each of these Elements will transfer to RFLI at this time.

Responsibility for care and maintenance of Portals and Shafts is being transferred to RFLI in advance of Trial Running through the Handover of each of the ten Elements. The C&C assets installed in the Portals and Shafts are not included in the transfer to RFLI as part of these Element Handovers and will follow as part of the Railway Systems Element at SC ROGS.

### 2.3 The approach to completing the stations

Handover to RFLI of Custom House Station occurred in May 2020. The C&C assets at Custom House did not form part of this early Handover and will be handed over to RFLI as part of the Railway Systems Element, but not necessarily coincident with SC ROGS.

All other Stations must achieve the minimum state of configuration called SC1, which demonstrates that the station is sufficiently complete to support Trial Running. Responsibility for care and maintenance is not transferred to either RFLI or LUL at SC1.

Neither RFLI nor LUL can accept responsibility for care and maintenance of a below ground station until Routeway assets that support station operational safety are tested and assured. Most of the stations will therefore transfer to the relevant infrastructure manager after SC ROGS and will take place at intervals between commencement of Trial Running and commencement of Trial Operations.

The responsibility for each below ground station will be transferred to the IM when the station satisfies the requirements for a Staged Completion at a milestone called 'SC3 ROGS'. It is possible for SC3 ROGS for a station to occur before SC ROGS for the Routeway, but only if the above described condition has been met requiring Routeway assets that support station operational safety to be assured.

It is a pre-requisite of Trial Operations that the stations must be integrated with the Railway and it is intended that all stations, except Bond Street, will be transferred to their respective IMs before Trial Operations. As a minimum there are five stations which must have been transferred to the IMs to support Trial Operations – Paddington, Tottenham Court Road, Farringdon or Liverpool Street, Canary Wharf and Abbey Wood (which has already been transferred).

Any below ground station which has not been transferred by the time RFLI commences Railway Trial Operations must achieve a state of configuration called SC2, which demonstrates that the station is sufficiently complete to support Railway Trial Operations by RFLI.

### 2.4 Project Development Agreement Requirements on Handover

CRL is a delivery vehicle to manage and deliver an integrated Railway that is compliant with the Sponsors Requirements.

The Project Development Agreement (PDA) appoints CRL to achieve Substantial Completion and Final Completion of the Crossrail Project on behalf of its Sponsors. Achieving this requires several activities to be undertaken, of which Handover is one. Below are several extracts from the PDA that relate to Handover between CRL and the Operators:

- CRL shall manage and deliver the Crossrail Project in a manner that will oblige the operators to accept Handover of assets and systems (Clause 3.2).
- CRL shall procure the Handover of groups of assets and/or systems (each such group constituting an "**Element**" of the Railway) to the relevant Operator after satisfactory completion of Dynamic Testing in respect of each such Element in accordance with the Assurance Process (a "**Handover**") (Clause 16.2(a))

- CRL shall be permitted to affect a phased Handover of the Elements in such manner as it considers appropriate in accordance with the Delivery Strategy, subject always to the agreement of such phasing by the relevant Operators and provided that the aggregate of the Elements constitutes the complete Railway (Clause 16.2b)

In relation to Handover of the On-Network Works, it states that:

- Network Rail will have the responsibility for operation, care and maintenance of the On-Network Works throughout the Development Phase and so CRL will not affect a handover of the On-Network Works as such; and
- Network Rail will be responsible for assuring itself in relation to the design and implementation of the On-Network Works on a basis that will allow it to assume responsibility as Infrastructure Manager for the operation of the On-Network Sections after completion of such On-Network Works.

Following Handover of an Element to the relevant Operator, CRL shall cease to have responsibility, including the responsibility to pay for:

- The control and management of that Element:
- The care and maintenance of that Element provided that:
  - CRL shall be obliged to carry out any outstanding works and/or rectify any snagging items
  - CRL shall be responsible for the rectification of any defects in the Element identified within the defect liability period
  - CRL shall be responsible for any damage done by its employees, agents and contractors to such Elements of the Railway as have been handed over

In respect of Trial Running, it states that CRL may commence Trial Running pre or post-Handover. CRL shall reimburse any reasonable incremental costs of staff, vehicles, energy and other consumables incurred by the Operators in assisting CRL to perform the Trial Running.

In respect of Operator acceptance from CRL, it states that the Operator will accept Handover of each such Element (including the Rolling Stock, RfL Stations, and the Depot) when, in relation to that Element, the following criteria are satisfied:

- The Assurance Process has demonstrated that CRL has satisfactorily completed Dynamic Testing in accordance with that Assurance Process.
- CRL has satisfied the deliverables specified in Clauses 16.3(a)(iii) to the extent reasonably required for the Operator to accept the care and maintenance of that Element as contemplated by Clause 16.2.

### **3 Achieving Handover of the railway**

Successful Handover of the Elements is where the IMs accept the transfer of legal responsibility for the assets and systems and become accountable for management and maintenance of those assets. For transfer of the Routeway assets, Dynamic Testing must be satisfactorily completed. Transfer takes place when both CRL and the IM sign the Element Completion Handover Certificate (ECHC) which satisfies CRL's obligation to ensure the works have been delivered in accordance with the Assurance Process.

A successful Handover of the On-Network Works (ONW) is one where the IMs of the Elements being delivered by Network Rail – as an Industry Partner of CRL (defined in the PDA) – accept responsibility for the management and/or maintenance of those Elements following Network Rail's Asset Management Plan (AMP) process.

### **3.1 Handover Requirements**

A Handover will be achieved once the following nine requirements are satisfied:

1. Responsibilities and Accountabilities change
2. Handover documentation transferred
3. All necessary Agreements in place
4. Works are complete
5. Training delivered
6. IM readiness
7. Spares and Equipment
8. Warranties and defect liabilities
9. Asset inventory database

Handover Requirements are described in detail in Section 7.

### **3.2 Elements**

The Crossrail Project infrastructure has been packaged into Elements as described in the PDA and in consultation with RFLI and LU. The Element descriptions include, for completeness, works being delivered by NR, but the CRL Handover processes and procedures only apply to those Elements being delivered by CRL. It has been agreed between CRL, RFLI and LU that there will be a lead Infrastructure Manager (IM) for each Element - e.g. London Underground shall be the lead IM for the LUL Central Operating Section Station Elements. LUL shall consult with MTR to ensure their operating needs are understood and agreed.

A summary list of Elements agreed with RFLI and LU is shown in Figure 4.1 on the following page. See also Appendix 4 for the Element Scope Map.

Element Group		Element	Chapter	Delivered by	Stage Required	
Central Operating Section (Routeway)	Routeway	1. Railway Systems (RS)	Platform Train Interface	CRL	3a	
			Comms&Controls	CRL	3a	
			Track	CRL	3a	
			Energy	CRL	3a	
			Tunnel Systems&Safety	CRL	3a	
			Signalling	CRL	3a	
			2. Non Traction Power (NTP)	-	CRL	3a
		3. RouteWay Civils (RWC)	Running Tunnels	CRL	3a	
			Connaught Tunnel	CRL	3a	
			CRL Surface Rail	CRL	3a	
			NR Surface Rail	CRL	3a	
			4. Plumstead Maintenance Facility (PMF)	-	CRL	3a
			5. Plumstead Stabling Sidings (PSS)	-	CRL	3a
		Portals	6. North Woolwich Portal (NWP)	-	CRL	3a
			7. Pudding Mill Lane Portal (PML)	-	CRL	3a
	8. Victorial Dock Portal (VDP)		-	CRL	3a	
	9. Royal Oak Portal (ROP)		-	CRL	3a	
	10. Plumstead Portal (PLP)		-	CRL	3a	
	Shafts	11. Stepney Green Shaft (STG)	-	CRL	3a	
		12. Mile End Shaft (MES)	-	CRL	3a	
		13. Eleanor Street Shaft (ESS)	-	CRL	3a	
		14. Limmo Peninsula Shaft (LIM)	-	CRL	3a	
		15. Fisher Street Shaft (FIS)	-	CRL	3a	
Central Operating Section (Stations)	LU Stations	16. Liverpool Street Station (LIS)	-	CRL	3a	
		17. Bond Street Station (BOS)	-	CRL	3a	
		18. Tottenham Court Road (TCR)	-	CRL	3a	
		19. Farringdon Station (FAR)	-	CRL	3a	
		20. Whitechapel Station (WHI)	-	CRL	3a	
	RFL Stations	21. Custom House Station (CJH)	-	CRL	3a	
		22. Canary Wharf Station (CWS)	-	CRL (OWG)	3a	
		23. Woolwich Station (WOO)	-	CRL	3a	
		24. Paddington Station (PAD)	-	CRL	3a	
Rolling Stock and Depot		25. Rolling Stock	-	RfL	All Stages (phased delivery)	
		26. Old Oak Common Depot	-	RfL	2	
		27. Ilford Yard Stablings	-	CRL	1	
		28. Yellow Plant	-	RfL	3a	
<b>ON Network Works Elements (NR Handover to either NR or TOC)</b>						
South East Spur		1. Abbey Wood Station	-	NR	3a	

Figure 3.1: Summary List of Elements

Abbey Wood Station and the South East Spur of the COS are delivered by NR. The station is handed over directly by NR to NR’s operations team who in turn handover to the station operator. The track, supporting infrastructure and Overhead Line Electrification (OHLE) of the South East Spur are handed over to CRL for completion of Railway Systems works (via the C610, C660 and C620 contracts) and in turn will be handed over to RFLI as part of the Railway Systems and COS Tunnels (and structures) Elements.

Each Element forms part of the Railway and Elements do not exist independently of one another. Their boundaries are defined for the purposes of Handover by the future ownership of the assets and/or systems by the respective IM to whom they are being handed over. Therefore, more than one Element can fall within the same geographical footprint, particularly for Stations, Shafts and Portals.

Elements follow the System Description documents which were produced for the Final Design Overview (FDO) reports. The full definition of future RFLI and LU ownership of assets can be found in the document IM Boundaries Document [Ref 12 IM Boundaries Document].

### 3.3 CRL Project Works

Crossrail Project Works are defined within the PDA as the permanent and temporary works required for the implementation of the Crossrail Project. Handover of CRL Project Works to third parties (non IMs) – such as the bulk supply points to be owned by the National Grid - are not classified as Elements of the Railway and will follow their own project specific handover process as agreed with their future owners.

### 3.4 On Network Works

Except for the South East Spur which is covered under the Routeway Civils Element, the On Network Works are delivered under the NR Handover and Assurance process and not addressed in this Strategy and Plan.

## 4 Programme Delivery Plan

### 4.1 Trial Running

Trial Running verifies that the infrastructure is capable of reliably meeting the capacity and other requirements of the CRL Programme Functional Requirements and the Sponsors Requirements through the demonstration of trains running to a trial timetable. Trial Running is the opportunity for CRL to collect the assurance evidence needed to satisfy the Substantial Completion criteria in the PDA.

CRL has an obligation under the PDA (section 16.3 (a) (ii)) to complete Trial Running prior to the operator's period of Trial Operations. The requirements for this are outlined in the Crossrail Trial Running Strategy [Ref 7 Crossrail Trial Running Strategy].

At Trial Running the Railway will be transferred to and operated by RFLI and the Railways and Other Guided Transport Systems (Safety) Regulations (ROGS) will apply. RFLI will stand up as the Infrastructure Manager (IM) and will take safety and access control for the shafts, portals and equipment in the Routeway with the RFLI Rule Book then in use and MTR as the designated Train Operator. Once the Infrastructure Manager has stood up under ROGS, this cannot be reversed although approval from the ORR remains conditional until a full suite of evidence has been gathered when Trial Running is completed. The accountability for the applicable assets of the Central Section is transferred from CRL to RFLI and this comprises the following Elements:

- Railway Systems
- Routeway Civils
- Non-Traction Power
- Plumstead Maintenance Facility
- Plumstead Sidings
- All Portals
- All Shafts

Stations are not required for Trial Running but they must be configured to meet requirements that support Trial Running. These requirements, described as the SC1 configuration, include:

- A designated and protected stairwell for emergency evacuation of a train crew and/or for platform access by emergency services
- Systems which support Systemwide Equipment Rooms (e.g. heating and cooling in those rooms)
- Systems which support safety (e.g. fire detection)
- Maintenance arrangements for those systems
- Access arrangements for RFLI, MTR and the Station Contractor
- Protection measures for all systems supporting the railway operation during Trial Running that allow the Station Contractor to continue with their works

No transfer of station assets to an IM will occur at SC1, and the designated CRL contractor will remain as Principal Contractor. Definitions of SC1 can be found in the “SC1 Configuration State Evidence Paper, CRL1-XRL-O7-RSP-CR001-50003.

All Stations must provide confirmation of enactment of SC1 prior to the transfer of the Routeway to RFLI. It should be noted that the achievement of a SC3 configuration prior to Trial Running does not change the requirement for SC1 to be enacted.

#### **4.2 Railway Systems Trial Operations**

Trial Operations for the Routeway is the configuration state where the Operators carry out operational scenarios, training and familiarisation for running the railway. Routeway systems which have undergone a Staged Completion for Trial Running will complete a further Staged Completion for additional functionality to meet the required configuration to support Trial Operations. RFLI will continue to be the IM for the Shafts, Portals and Routeway including the Railway Systems assets located within a station, all of which have already been transferred.

Until a station Element has completed a Staged Completion or Handover with asset transfer to the IM, CRL or its contractor will remain responsible for the station.

As stated in section 2.3 a minimum of five key stations are required to be transferred to the IM for Railway Systems Trial Operations, however there are requirements which must be met by those stations which have not been through a Staged Completion or Handover. These requirements, described as the SC2 configuration, include:

- Designated and protected stairwells for emergency evacuation of a full train and/or for platform access by emergency services
- Systems which support Systemwide Equipment Rooms (e.g. heating and cooling in those rooms)
- Systems which support safety (e.g. fire detection)
- Maintenance arrangements for those systems
- Access arrangements for RFLI, MTR and the Station Contractor
- Protection measures for all systems supporting the Railway post commencement of Trial Running that allow the Station Contractor to continue with their works.

At SC2 no handover of Station assets will occur. The environment will change as the Station worksite will now be next to the operational railway and include protected operational spaces. Please note the requirements of SC1 and SC 2 are not the same, specifically with respect to safety, access and emergency arrangements. Definitions of SC2 will be found in the “SC2 Configuration State Evidence Paper, CRL1-XRL-O7-RSP-CR001-50003.”

It is expected that stations will complete works, testing and assurance to enable progress from SC1 to SC3 ROGS such that SC2 will not apply. It is planned that SC2 will be enacted only at Bond Street and care is

required in proposing this configuration state as a mitigation against not completing SC3 ROGS at other stations as it involves additional design.

### **4.3 Station Staged Completion (SC3ROGS) – Station Trial Operations**

Trial Operations for the Stations is the Configuration State whereby the Operators carry out operational scenarios, training and familiarisation for managing the Stations. Station Systems will be complete and assured for this configuration state in accordance with the requirements of Staged Completion. LU will be the IM for Tottenham Court Road, Farringdon, Liverpool Street and Whitechapel stations and RFLI/MTR will be the IM for Paddington, Canary Wharf, Woolwich and Custom House stations. Bond Street will remain with CRL until after Revenue Service has commenced.

Staged Completion at SC3 ROGS is the process by which assets of the Station Element are brought into operational use before Handover and can be carried out when all critical phase 3 integration testing and the appropriate safety justification and assurance case is in place.

It is intended that at the SC3 ROGS milestone all areas of the station Element will come under the ownership and operational custody/access arrangements of the IM. However, Staged Completion could also be applied to a 'partial' Element should this option be required. Staged Completion therefore applies to both:

- Staged Completion with minimal outstanding works (e.g. some documentation or snags) to satisfy the 9 requirements for Handover and all areas of the Element managed under the access arrangements of the IM. These and any other agreed snags/outstanding works will need to be resolved for Handover as agreed in the Element Outstanding Works List (EOWL)
- Staged Completion of part of the Element whereby the Element will be segregated into an area under the operational custody and access arrangements of the IM, and an area that remains under the custody and access arrangements of the CRL Principal Contractor. In this instance the associated assets within the Stage must be sufficiently complete to allow safe commencement of familiarisation and trial operations by the Infrastructure Manager (IM) and the SFO. All required assurance evidence for the defined scope will have been agreed and accepted by the IM.

For each scenario the defined scope of the Element that is being staged will require agreement of a maintenance regime with the IM for the period until Handover.

Stations rely on several Routeway Systems for their operation, including HV power, tunnel ventilation, radio systems etc. Unless these systems are in an assured and operational state, they cannot be relied upon by the Station. Therefore, no Station will reach SC3ROGS prior to the confirmation that these assets are assured and, in most cases, not until after Handover of the Routeway to RFLI.

The Programme Delivery Plan currently shows Farringdon station as achieving Staged Completion at SC3 ROGS prior to SC ROGS, but all other stations (except Bond Street) are expected to achieve SC3 ROGS after commencement of Trial Running and before commencement of Trial Operations.

## **5 Element Handover approach**

### **5.1 Railway Systems, Non-Traction Power and Routeway Civils Elements**

To simplify the collation of assurance, the Railway Systems Element has been split into Chapters which mirror the FDO. The Chapters are:

1. Platform Train Interface (PTI) comprising Platform Screen Doors, Driver Only CCTV, Emergency Stop Plungers, and Dispatch Lights



2. Communications and Control comprising Radio, Crossrail Data Network, Optical Fibre Network, Telephony System, SCADA/Central Management System, SCADA/Station Management System, CCTV, Public Address Voice Alarm System, Customer Information System
3. Track including Equipment, Points, Gauging, and Interfaces
4. Energy Systems including Traction Power System, OHLE and Traction Earthing & Bonding
5. Tunnel Systems including Tunnel Walkway, Tunnel Ventilation Systems, Tunnel Pumped Drainage, Tunnel Fire Main, Cable Management System, Cross Passage Doors, Signage, LV Power Distribution System, and Lighting System
6. Signalling Systems comprising Automatic Train Supervision, Automatic Train Control, Computer Based Interlocking, Radio Communication System, Power Supplies, Transitions, and Interfaces

The Route Control Centre and Back Up Control Facility are not a separate chapter, but a Handover Completion Report will be produced for the function of the rooms at part of Railway Systems, with the systems assets addressed in the relevant chapters.

As well as the platform screen door assets to be transferred, PTI is also a function that must be assured for Trial Operations which requires the Railway Systems and station platform finishes and lighting levels in the final state. It therefore requires both the Routeway to be assured for the ROGS transfer and the station platform areas to be assured.

For further information on the Chapters see System Description for FDO Component Railway Systems (CRL 1-XRL-08-RGN-CRG03-50006). In the System Description, Non-Traction Power is included in the Energy Chapter but for Handover purposes it is an Element in its own right. However, evidence is being collated to demonstrate completion in conjunction with the Energy Chapter.

The chapter structure of the Railway Systems allows for progressive assurance and acceptance although the collected assets will be handed over as a single Element. Each Chapter will have its own completion report and there will be an overarching Element Completion Handover Report to capture integration and higher-level system documentation.

Routeway Civils has also been split into Chapters as follows:

1. Running Tunnels for the routeway including crossovers and cross passages with tunnel segment construction, sprayed concrete lining construction and Spheroidal Graphite Iron segmental construction
2. Connaught Tunnel which re-uses an existing brick tunnel that is upgraded with a concrete box construction and new headhouse
3. CRL Surface Rail incorporating the civils infrastructure supporting the track either side of the Connaught Tunnel, the Emergency Intervention Compounds, Silvertown Footbridge and Westbourne Park area infrastructure
4. Network Rail Surface railway comprising the South East Spur and North East Stub (by PML)

## **5.2 Communications and Control Assets/Systems**

The Communication & Controls (C&C) assets present a unique challenge in Handover because although they are part of a single Railway Systems Chapter, they are present in all other Elements and are required for operation of the Element. The approach to transfer of the C&C assets is different across the Elements:

- Handover of Shafts, Portals and Custom House station excludes their C&C assets. These C&C assets are completed for the C&C Routeway Chapter and will be transferred to the IM as part of the Staged Completion for Railway Systems at SC ROGS
- Other than for Custom House, as mentioned above, the C&C assets located in stations for the operational management and control of the station are transferred to the IM with the specific station Element at SC3 ROGS

The Staged Completion of the C&C Chapter as part of the Railway Systems Element will achieve the minimum configuration state required to support Trial Running. During Trial Running further functionality will be introduced to support Trial Operations. As each station reaches a Staged Completion at SC3 ROGS and transfers to the IM, the C&C assets for that station will be linked to the RCC.

The process of incremental configuration updates for the Routeway will be repeated in order to support Revenue Service and End State. The full C&C Handover strategy is detailed in the HEP (CRL1-XRL-Z-STP-CRG03-50012).

### **5.3 Handover of Shafts, Portals and Custom House Station**

In advance of the Routeway being transferred to RFLI at SC ROGS, the Shafts, Portals and Custom House Station Elements are to be transferred to the IM to spread the burden on resources required to produce, review and accept assurance deliverables.

The Office of the Rail Regulator has stated that RFLI must have accountability for a railway to be an Infrastructure Manager under the ROGS regulations. However, the early transfer arrangement has been established for these eleven Elements which will see RFLI take accountability for the premises and the assets within in accordance with the requirements of the Handover process. A full ECHR will be prepared for each Element.

Any Rail Systems asset installation at these Elements will be complete and determined to be safe but will not be included in the transfer at Handover of the Element.

As RFLI will be responsible and accountable for the Element following Handover, RFLI access and works procedures will apply. Contractors undertaking works will require agreement with RFLI but will still be Principal Contractor for their work site within the Element.

### **5.4 Plumstead Maintenance Facility and Stabling Sidings**

Plumstead Maintenance Facility is required to support management of the railway and is also to be transferred to RFLI as a Staged Completion prior to the Routeway transfer at SC ROGS. The stabling sidings will be transferred to RFLI at SC ROGS.

The facility includes:

- Three non-electrified sidings for the stabling, formation, loading and unloading of dedicated infrastructure maintenance rail vehicles
- Refuelling facilities for the infrastructure maintenance rail vehicles
- Facilities for maintaining the infrastructure maintenance rail vehicles
- Lay down space for the storage of infrastructure maintenance components when they are not installed on a rail vehicle
- A facility for the manual jet washing of the infrastructure maintenance rail vehicles
- Storage facilities for infrastructure maintenance equipment and consumables
- Parking for approximately 20 maintenance vans and trucks
- Parking for approximately 100 staff vehicles

The sidings include:

- Eight electrified sidings, each able to accommodate a passenger train up to 205m long and associated signalling equipment facilities
- Facilities for cleaning stabled trains including covered storage facilities with a waste compactor
- Accommodation and messing facility for infrastructure maintenance staff and train crew. Facilities will include offices, briefing, changing, shower and locker accommodation and booking-on point.

## 6 Handover Process

### 6.1 Accountabilities

Handover of the Crossrail Project will be delivered through a collaborative effort across CRL in close consultation with the IMs. Clear roles and responsibilities have been defined for agreeing completion of an Element for Handover. A summary of these is as follows:

- **CRL Project Manager's Representative:** states that the assets within the Element are complete and compliant with the Sponsor and Functional Requirements except where concessions or derogations have been sought and granted, and subject to the completion of the items listed in the Element Outstanding Works List
- **CRL Technical Heads of Discipline** state that they have received evidence in accordance with the TAP that the works have been evidenced as compliant with the Sponsor and Functional Requirements, with the exception of any declared snags and/or outstanding works
- **CRL Technical Heads of Assurance and Integration** declare that the integration activities described in the TAP have taken place, any applicable concessions have been granted, and the Element meets the Sponsor and Functional Requirements, with the exception of any declared snags and/or outstanding works
- **CRL Supervisor** declares that the works have been carried out in compliance with the works information and that all works have been carried out in accordance with the contract, with the exception of any declared snags and/or outstanding works
- **CRL Chief Engineer** certifies that the design outputs produced by the Contractors, including the integration activities through CRL, satisfy the Sponsor and Crossrail Programme Functional Requirements and that sufficient evidence has been provided in accordance with the requirements of the Assurance Process, such that the outputs can be incorporated into the Crossrail Project, and will ultimately deliver a safe, integrated and resilient railway that delivers the required Project Performance

### 6.2 Element Outstanding Works

When an Element is completed and transferred using the Handover process it is permissible for there to be an agreed set of outstanding works to be finished after transfer. Outstanding works are to be captured on the Element Outstanding Works List (EOWL) and can include punchworks, defects, non-conformances and open observations. The plan for completion of items on the EOWL is to be agreed with the Chief Engineer and the IM for determination that the requirements are maintained for Trial Running and other configuration states.

Some EOWL items may extend beyond SC ROGS and Trial Running, or beyond SC3 ROGS and Trial Operations. For example, at Revenue Service, a pre-determined scope of Communication & Control items as well as enhanced Signalling functionality work will still be required to be completed.

### 6.3 Safety Justification Strategy

A Safety Justification (SJ) is an argument demonstrating an Element is safe based on the presentation of evidence to mitigate identified hazards. A SJ is produced by CRL to support the assurance of each of the Elements and Railway Systems Chapters and this is in addition to the Engineering Safety Justification (ESJ) produced by the contractors delivering the works. A Central Operating Section SJ is also produced and relies on the progressive build-up of the individual SJs.

At Trial Running and Trial Operations phases, the configuration of the railway will be different to the End State. The CRL Element SJs are produced for the End State (supported by End State System Definition and End State Project Wide Hazard Record (PWHR)) but contain an Appendix Safety Statement covering the changes in configuration and organisational interfaces when required. The

dependencies from all element Safety Justifications will be tracked by the overall Central Operating Section SJ which will be developed for each phase.

The SJ may in some cases be supported by a Structured Engineering Judgement, the process for which are to be found in the Technical Assurance Plan [Ref 14 Crossrail End-to-End Safety Justification and Assurance].

#### **6.4 Handover Execution Plan**

For each Element and each Railway Systems Chapter a Handover Execution Plan (HEP) is required. This defines the route to Handover including any variabilities in achieving the End State, and sets out particular handover boundaries, exclusions, access and security in the interim condition.

Where transfer to the IM takes place with an interim configuration state, the HEP must clearly include the plan to complete the outstanding works and to achieve the End State.

#### **6.5 T-Minus Stage Gate Process**

A T-Minus Stage Gate Process has been put in place to manage and demonstrate the completion of assurance for each Element prior to Handover or Staged Completion. The T-Minus Gate Process is documented in CRL1-XRL-O7-GPS-CR001-50016.

Meetings shall take place throughout the T-Minus countdown to completion with two Gates:

- Meeting held at T-12 to confirm entry into the pre-agreed approach to Staged Completion, Handover and IM occupancy
- GO Meeting held at T-4 for an executive review of the ECHR or SCR status, with presentation by the Delivery Team for final 'Go/No-Go' determination that Staged Completion, Handover and IM occupancy can proceed

#### **6.6 Regulatory Approvals**

The process for approval and acceptance of new assets and their deployment is governed by two sets of regulations:

1. The Railways (Interoperability) Regulations (RIR), which requires Project Entities (including CRL, Bombardier, the Yellow Plant provider and NR) to obtain Authorisation to Place into Service (APIS) from the Office of Rail and Road (ORR) for new assets by demonstrating their compliance with Technical Standards for Interoperability (TSIs), Notified National Technical Rules (NNTRs) and Common Safety Methods (CSMs), and;
2. The Railways and other Guided Transport Systems (Safety) Regulations (or "ROGS"), which require Transport Operators (including RFLI, LU, MTR Crossrail and NR) to demonstrate their fitness to be granted a Safety Authorisation or Safety Certificate, which is granted by the ORR following submission of a Safety Management System (SMS) that meets regulatory requirements for main line Transport Operators according to the Common Safety Methods (CSMs).

Handover from CRL to the Operators does not depend upon any regulatory approvals. However, the new CRL assets cannot be commercially deployed until granted Authorisation to be Placed Into Service under the RIR and only then by a licensed operator holding the requisite Safety Certificate or Authorisation under ROGS.

CRL is the Project Entity responsible for obtaining the APIS for the fixed infrastructure within the Central Operating Section from the ORR. CRL will apply for the APIS prior to the commencement of Stage 3 passenger service. To secure APIS from the ORR, CRL will ensure that the infrastructure complies with the relevant TSIs, NNTRs, and CSMs. The overall plan enabling CRL to secure the necessary approvals is defined in CRL's System Safety Plan [*Ref 48 Engineering Safety Management – System Safety Plan*]. CRL Engineering Safety Management will make an application to the ORR for APIS for the COS infrastructure.

In addition, Bombardier is the Project Entity for the Rolling Stock and will carry out all activities to bring the Class 345 into service. The Project Entity for the Yellow Plant units will secure the APIS for them. Network Rail is the Project Entity for all other parts of CRL, including the On-Network Works.

The Crossrail Engineering Safety and Assurance Case Strategy [*Ref 64 Crossrail Engineering Safety and Assurance Case Strategy*] details how CRL will demonstrate the fundamental building blocks to provide the End-to-End Safety Justification and Assurance Case for the entire CRL Project, including the Central Operating Section, and all relevant interfaces between CRL, Network Rail and Rolling Stock for the complete railway.

ROGS requires that the Transport Undertaking (MTR Crossrail) obtains a Safety Certificate, and that the Infrastructure Managers (such as RFLI, LU and MTR for stations) obtain a Safety Authorisation for their assets. RFLI will submit to the ORR an application for safety authorisation four months prior to Trial Running, detailing its SMS, to allow authorisation to be granted prior to Handover. MTR Crossrail will carry out appropriate safety validation to obtain an amended Safety Certificate and Authorisation under ROGS for operation of its trains as the Transport Undertaking and as the Infrastructure Manager of stations, and, in addition, their SMS will be updated to reflect the change in operational arrangements. LU will also formally submit their updated Safety Certificate and Authorisation to LU DRACCT and LU Executive approval prior to Revenue Service.

Further information is contained in the strategic plan to gain Regulatory Approvals for the end to end CRL railway which details the organisations involved in obtaining regulatory approval and how this will be achieved [*Ref 65 High Level Strategic Plan for End to End Railway Regulatory Approvals*]. The principles of the Regulatory Approvals programme to secure approvals and authorisations to deploy all the assets required to deliver end-to-end Crossrail train services is included in the Crossrail Acceptance and Regulatory Authorisations Programme [*Ref 66 Crossrail Acceptance and Regulatory Authorisations Programme*] which details the plan for the Central Operating Section, works affecting Network Rail and Heathrow Airport Limited lines used by Crossrail services, the Crossrail new train fleet, and the required new or amended approvals required by the Duty Holders.

CRL will formally agree with ORR and RFLI/LU/MTR prior to Handover the extent to which ROGS will apply, and to which exemptions will be granted.

## **7 The Requirements of Handover**

### **7.1 Change of Responsibilities and Accountabilities**

At the designated milestones, using the process of Staged Completion or Handover, LU and RFLI accept transfer of responsibility and accountability for the control, management, care and maintenance of CRL Elements. A Staged Completion Report or an Element Completion Handover Report together with the appropriate Certificate are prepared to facilitate the process.

## Element Completion Handover Report and Certificate

The Element Completion and Handover Report (ECHR) and supporting documents [*Ref 49 Element Completion Handover Report Process*] were derived from the Completion and Consent to Operate Report as detailed in LU Assurance Standard S1538 clause 3.20 and amended to provide a document suitable for CRL.

CRL produces separate ECHRs for each Element and each Chapter of the Railway Systems and Routeway Civils Elements. In addition, a Railway Systems and Non-Traction Power ECHR is produced to provide evidence of the integration of the Railway Systems Chapters, and provide the legal references for other Routeway Elements. The ECHR is completed and signed by CRL Heads of Discipline, Engineering Safety Management, and the Chief Engineer to declare readiness for Handover of the Element.

The Element Completion Handover Certificate (EHC) is derived from the Project Completion and Handover Certificate, as detailed in TfL's Pathway Process.

CRL prepares an EHC for each completed Element, the certificate is signed by the relevant Delivery Director on behalf of the Programme Director and it is submitted to the IM. RFLI and LU accept Handover of the Element by counter-signing the certificate and returning it to CRL, and the IM takes responsibility and accountability for the control, management, care and maintenance of the Element from the date of Handover stated in the EHC. When applicable, it will be the role of the lead IM (RFLI or LUL) to obtain assurance from the interfacing IM (RFLI or LUL) to enable them to sign the EHC.

The EHC also enables CRL to satisfy PDA clause 16.3 a (i) and provide the Sponsors with "certificates of Handover".

## Staged Completion Report and Certificate

When part of an Element is to be transferred to an IM, the same Handover process is followed but it is referred to as a Staged Completion. A Staged Completion Report (SCR) and supporting documents [*Ref 49 Element Completion Handover Report Process*] are produced following the same format and basis as the ECHR.

For transfer of part of an Element, a 'Staged Completion Certificate' (SCC) will be issued. This is prepared and issued in the same way as the EHC and serves the same purpose when counter-signed by the IM.

## 7.2 Transfer of Handover Documentation

A generic baseline of documentation required for Handover has been agreed with RFLI and LU. This list of deliverables is called the Handover Master Deliverables List (HMDL) *baseline* [*Ref 73 Handover Master Deliverables List (HMDL) baseline*]. The HMDL is a subset of the overall Master Deliverables List (MDL) for the Project and covers assurance evidence, documents required for operations and maintenance, as-built drawings, and commercial, land and property agreements.

The transfer and acceptance of documentation between CRL and RFLI and LU is documented in the CRL Project Information Handover Procedure [*Ref 62 Project Information Handover Procedure*]. This process covers the export of documentation from the CRL document management system into the RFLI and LU systems. It also describes the process for the acceptance of the documentation by RFLI and LU.

Element specific HMDLs are created using the generic HMDL baseline to help identify the relevant contractor deliverables, together with additional assurance information provided by CRL through its management and integration activity. CRL provides the deliverables on the Element HMDLs to RFLI and LU progressively over the lifecycle of the CRL Project. HMDL acceptance per Element is part of the ECHR process and required to obtain the formal acceptance by LU or RFLI of the Element through the ECHC.

Tracking of progress of the assurance deliverables is done through the Crossrail Assurance Reporting Environment (CARE) which is aligned with the HMDL and able to generate reports on the availability of agreed deliverables required for Handover and the status of acceptance.

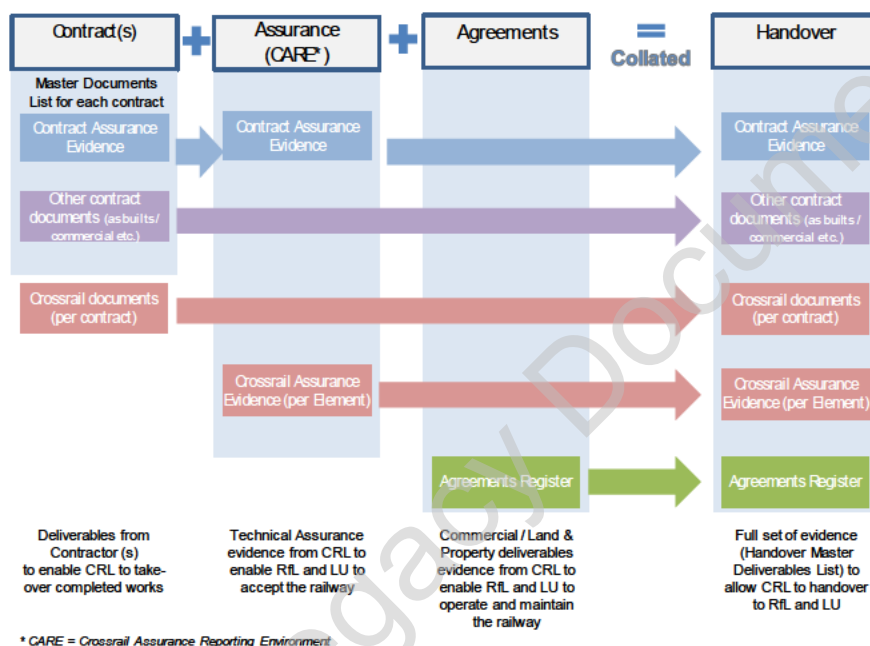


Figure 7.1: Collation of Handover documentation

### 7.3 Agreements

CRL’s Agreements Management Plan (AMP) [Ref 43 Agreement Management Plan Overview] sets out the mandatory processes that identify which Agreements are required and once established where management accountability rests within CRL, LU and RFLI. This is supported within a programme management tool, (Agreement Management System [AMS]) which will be used to monitor and track the transfer of management accountability from CRL to either LU or RFLI for agreements currently under CRL management.

The Crossrail Legal Agreements Register (over 2000 agreements) is held in AMS and CRL, LU and RFLI Management Accountability records are to be updated following the signing of individual ‘Transfer Forms (TF)’ which are part of the Handover process. Where CRL have held the management accountability, the TF records the Close Out Status, flags up any ongoing potential latent liabilities and / or outstanding obligations that CRL have noted under the Agreement Commitments section.

The TF is signed by the current accountable CRL Agreement Manager (generally the CRL Project Manager at the Element) to indicate that CRL have discharged their management responsibilities, by the CRL Head of Agreements Management to indicate that this has been the subject to an assurance review and suitable close out statements and / or evidence captured. The LU or RFLI designated manager who will be taking on the management accountability after Handover also then signs the TF, generally following a handover briefing as necessary between the parties.

Where LU or RFLI have not assigned post-Handover accountable managers, the default position is that their respective Agreement Teams under delegated authority, sign off the TF. Once the LU or RFLI permanent Agreement Managers are determined the Crossrail Legal Agreement Register record is to be updated.

The list of agreements at each Element is at Handover incorporated into an Agreement Handover Schedule (AHS) which summaries the status and key points taken from the individual TF. This is signed off by the CRL Project Manager at the Element and the LU or RFLI Agreement Team Manager under delegated authority from the LU or RFLI.

The AHS will list any Agreements where CRL retain management accountability post-Handover. Once CRL have closed out any outstanding matters, management accountability will be transferred to LU and RFLI following Handover and recorded in an associated Transfer Form.

### **In Negotiation**

Agreements that are under negotiation are subject to the AMP to ensure they comply with CRL Governance and Commitment procedures. Each agreement is tracked through its drafting and negotiation. At Handover all such agreements are also listed in Agreement Handover Schedule.

Where any 'Critical' category Agreement is not in place at Handover, CRL will obtain a confirmatory statement from LU and RFLI that they not a requirement for the Handover. Where such Agreements are LU or RFLI Operational Agreements they will not inhibit Handover.

### **Agreements Management System**

CRL's Agreements Management Plan (AMP) [*Ref 43 Agreement Management Plan Overview*] sets out the mandatory processes that identify which Agreements are required. The Asset Management System (AMS) captures the list of Agreements, establishes accountabilities, and aligns them with the MOHS key dates. These are then incorporated into an Agreement Management Programme and tracked through the Agreement Management System (AMS) on the CRL Electronic Data Management System (EDMS). It recognises the high-level timeframes required to plan, negotiate and execute each individual Third-Party Agreement (TPA) through its various pre-contract gateways, and also establishes post-contract management accountabilities so that obligations that need to be completed to enable Handover to RFLI and LU can be tracked with visibility of progress for leadership teams.



The figure below depicts the Third-Party Agreements Lifecycle:

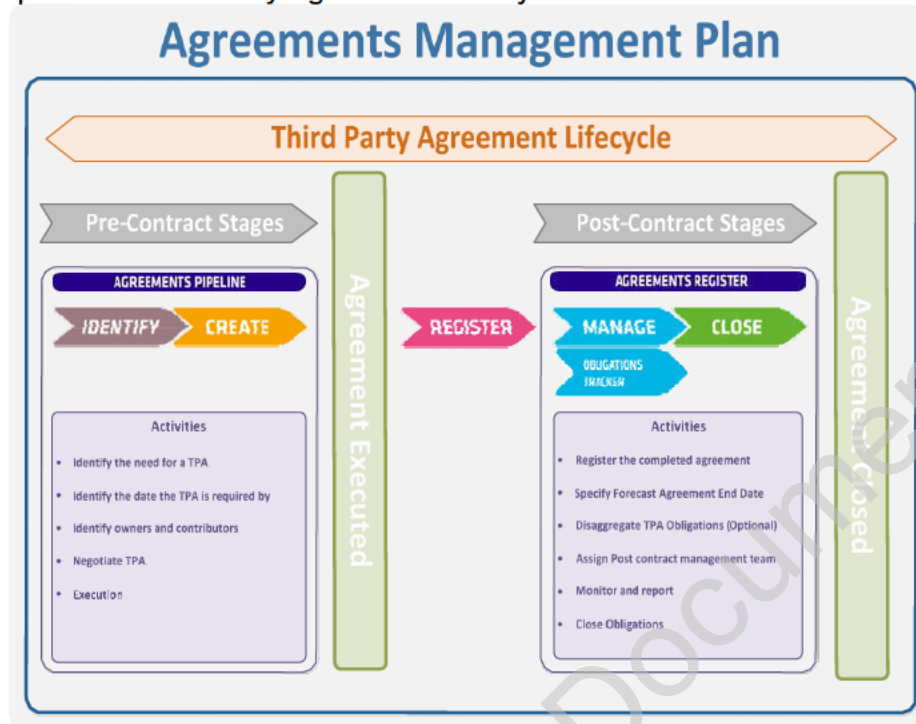


Figure 7.2: Third Party Agreement Lifecycle

Industry Partner Agreements (NR, HAL) that need to be in place to support Handover to RFLI and LU, which do not include a TfL mode as a signatory, are defined as 'Dependent Agreements'. These will also be included in the AMS and similarly linked to the MOHS key dates. The AMS does not cover agreements between CRL and CRL's Contractors.

### Undertakings and Assurances

During the passage of the Crossrail Bill through Parliament the Secretary of State (SoS) gave certain commitments known as 'undertakings and assurances' to a range of beneficiaries. There are circa 4,307 individual commitments distributed amongst a total of 749 undertakings & assurances as listed in the Crossrail Register of Undertakings and Assurance, which is publicly available on the CRL website.

Under assurance 14 the Secretary of State gave a commitment that any nominated undertaker will be contractually bound to comply with the Environmental Minimum Requirements (EMR) which includes the Register of Undertakings & Assurances. CRL is contractually bound to comply with the EMR under the Project Delivery Agreement (PDA). At Staged Completion CRL will provide either a statement of compliance, or a statement setting out any outstanding actions required to achieve and/or demonstrate compliance, commensurate with the scope of the Staged Completion and any agreement between CRL and the IM to complete those actions. At Handover CRL will provide a statement in the ECHR that the relevant asset has been designed and delivered in accordance with all the relevant undertakings and assurances.

It is envisaged that responsibility for any Undertaking and Assurances that apply to the operational railway will be transferred by the Secretary of State to the relevant future IMs such as RFLI, LU or NR.

### 7.4 Works Completion

Assurance for works undertaken by or on behalf of CRL in the Central Operating Section is delivered to the Sponsors, RFLI and LU by CRL in accordance with the Technical Assurance Plan (TAP) [Ref 14 Technical Assurance Plan]. The CRL assurance process aligns with the LU Standard for Assurance S1538.

The VAP Implementation and Progressive Acceptance Procedure [Ref 57 VAP Implementation and Progressive Acceptance Procedure] has been developed by the CRL Assurance team and sets out CRL's approach to verification throughout the project lifecycle. The risk-based verification activities outlined in the CRL VAPs have been developed and take into account the self-certifying nature of the Tier 1 Stations, Portals, and Shafts Contractors and Systemwide Contractors. The LU and RFLI / MTR[C]'s Verification Activity Plans have been developed and take into account CRL's verification activities. Completion of verification activities and closure of any issues identified is key assurance evidence for demonstrating Works completion.

These procedures describe the processes to demonstrate that CRL has exercised due diligence before accepting CRL construction works. Evidence provided by the contractors includes appropriate self-certification records and completed as-built details and record packaging, which is assured through the processes described within CRL's Construction Management Plan and Construction Quality Plan.

Construction works for all contracts are currently planned to be completed well in advance of Handover. The Contractors will undertake a care and maintenance role until Handover.

### **7.5 Training is in place**

CRL is required to deliver training to RFLI, LU & MTR and ensure they are competent to proceed in delivering their training to their own operation and maintenance personnel.

Each CRL Contractor produces a training strategy and plan. All training plans, training materials and training delivery are tracked, and progress reported against the Element Handover Execution Plans to ensure all required and agreed training is completed and delivered to the Infrastructure Manager prior to Handover.

CRL shall support, supervise and coordinate the entire training process by providing guidance and direction with respect to contractual requirements. CRL also acts as the interface between Contractor and RFLI/LU for planning and delivery of the training program and is accountable for successful delivery of all required training and familiarisation to RFLI and LU to the required level to enable readiness for Handover. The Training Strategy and Plan Template and Guide [Ref 68 Training Strategy and Plan Template and Guide] provides more information.

### **7.6 RFLI, MTR[C], LU and NR Readiness**

RFLI, MTR[C] and LU must demonstrate they will be ready to accept the Elements in line with their plans to accept Handover of the Railway.

RFLI requirements for handover and revenue service are set out in the RFLI Mobilisation Plan [Ref 70 RFLI Mobilisation Plan]. LU requirements are set out in the LU Readiness Plan [Ref 71 LU Readiness Plan] and the LU Handover and Revenue Service Routemap [Ref 54 LUCT Handover Routemap] which provides a high-level overview of the necessary steps required to achieve Handover and Revenue Service.

#### **RFLI Operational Readiness**

RFLI will recruit, train and mobilise an operational workforce to undertake the Signalling Command & Control activities at the CRL RCC.

CRL need to provide RFLI with a comprehensive set of rules, standards and user procedures in enough time to allow RFLI trainers to develop necessary training modules to deliver their training programme. Critical to this is the requirement to have in place the RCC Signalling & Supervisory Control and Data

Acquisition (SCADA) workstation simulators so that trainees can simulate and embed their knowledge learning. In order to deliver the training requirements, it is intended to mobilise up to 6 Service & Infrastructure Managers (SIMs) and have these people trained to receive “train the trainer” training from CRL and assist in the development of training modules and deliver training to other RFLI Employees.

Further details of RFLI’s Mobilisation, Training, and Competence Management strategies are contained within [Ref 44 Operations - MTR Staged Opening Plan].

**RFLI Maintenance Readiness**

The primary maintenance specifications emerged from the CRL design gates and as part of the Reliability, Availability and Maintainability (RAM) output requirements. These are fed into the Maintenance Integration Review Process (MIRP) to determine the holistic maintenance requirements in accordance with systemwide deployment.

RFLI and CRL deliver their respective elements of the overall plan in accordance with the CRL Maintenance Development Plan [Ref 45 Crossrail Maintenance Development Plan]. CRL designers determine the interventions required for inspecting and maintaining the Railway in accordance with the RAM output requirements. RFLI determine the planning and deployment of maintenance activities prior to Handover.

CRL include the necessary testing and commissioning of all maintenance / renewals tasks into the ‘readiness for operations plan’ such that RFLI can be fully competent (including depots; plant servicing, maintenance, deployment, operations and planning staff etc.) to deliver infrastructure, asset inspection and maintenance works to the Central Operating Section.

Topic	The RFLI outputs CRL can expect to be in place at Handover
Integrated Maintenance Specifications	RFLI’s Maintenance Strategy and Plan for the new infrastructure.
Maintenance approach	A compatible, deliverable and affordable maintenance approach by the future Infrastructure Managers. This will detail how the maintenance specified in RFLI’s Maintenance Strategy and Plan will be delivered safely, efficiently and effectively by a team of appropriate technicians within the access constraints of the railway. This will include demonstration of recruitment, training etc.
Integrated suite of maintenance plans	An integrated suite of maintenance plans, procedures and processes. The suite will be optimised, within the constraints of the initial capital budget, to minimise the costs and risks of maintenance and operation of the assets for the first 60 years of the Central Operating Section. It will also provide assurance that the specified maintenance can be delivered to support the performance requirements of the railway.

**Table 7.3: CRL expected maintenance readiness outputs of RFLI at Handover**

**LU Readiness**

LU need to undertake a variety of activities in order to ensure they are ready for operations and maintenance at those stations for which they become the IM. LU will need to include MTR within its readiness activities. Additionally, although the Paddington CRL station will be handed over to RFLI, the interchange subway with the Paddington LU station (Bakerloo line link) will be managed by LU and will also require operational and maintenance readiness activities.

CRL will affect LU in five principal ways:

1. The increase in size, number of assets and complexity resulting in introduction of additional hazards to the LU stations;
2. The need to increase operations and maintenance staff, the scope of maintenance contracts in order to safely manage and maintain the expanded complexes;
3. The physical integration of existing assets with the new and the consequent implications for station control and reliability of the LU operational railway;
4. The introduction of some new equipment, systems, procedures including RFLI assets in LU stations, and;
5. The introduction of Interfaces with RFLI maintainers and with MTRC operational staff on LU IM Stations.

The LU Readiness Plan [*Ref 71 LU Readiness Plan*] describes in detail all of the activities and processes LU will undertake to ensure they are ready for Handover.

### NR Readiness

As a self-assuring industry partner of CRL, NR will establish a mobilisation team and conduct readiness reviews in parallel with the Handover of new or changed infrastructure.

Training and familiarization will be undertaken by NR in respect of On Network Works (ONW) and also interfaces with the Central Operating Section.

### 7.7 Spares and Equipment

IMs will need spares and specialist equipment to maintain the reliability and performance of the passenger service in operation. CRL's approach towards spares is set out in the CRL Spares Strategy [*Ref 72 CRL Spares Strategy*].

Types of spares include:

- Spares to repair accidental damage or deliberate damage (vandalism)
- Spares for planned maintenance.
- Spares for repairing faults
- All spares required for repairing faults post expiration of the Contractors' defects correction period.

Contractors are required to provide lists of spares and critical spares with full ordering details in their Operations & Maintenance manuals. The most important are the Reliability Critical Items (RCIs) which are an output from the Reliability, Availability and Maintainability (RAM) analysis reports. RCIs are items with relatively high failure rates, possible obsolescence, short-life expectancies, are difficult to maintain or have novel features, any of which has the potential to reduce systems availability. Spares for RCIs are required to be quickly available to repair faults to restore services so that Mean Time To Repair targets [MTTR] of typically 2-12 hours can be achieved and restore Crossrail services to full capacity in the event of their failure.

CRL has recommended to the IMs the spares they should hold during the first year of passenger service operation, including planned maintenance spares. The IMs have reviewed CRL's recommendations and used them in IM Readiness planning, as they are accountable for spares during both Trial Operations and Passenger Service.

The purchase of routine spares has been agreed between CRL and RFLI/LU (at Period 13 2017/18 and Period 1 2018/19 Programme Delivery Boards) to be LU/RFLI's responsibility, including where purchased spares will be kept. The only exception to this is specialist equipment (items which require bespoke procurement) and certain railway spares left over from Dynamic Testing. RFLI and CRL have agreed what

spares are required for Dynamic Testing and have also agreed that RFLI will purchase leftover spares from that list on completion of Dynamic Testing.

Spares must be available at the point of Handover and their procurement status, identified storage location, and availability will be tracked as part of the Handover process for each Element.

## **7.8 Warranties and Defect Liabilities**

Under the PDA each CRL works contract must include a provision allowing CRL to assign, novate or provide the unexpired defects rectification completion guarantee and/or warranty provisions to the relevant IM/Operator or to either of the Sponsors (DfT, TfL).

CRL has discharged its obligations by including in the works contracts:

- third party rights for TfL, RFLI and/or LUL to enforce the terms of the works contracts directly against the contractors; and/or
- has procured collateral warranties in favour of LUL or RFLI

### **Project close-out post-Handover**

CRL will remain responsible for managing the close-out of the delivery contracts post-Handover and will maintain the capability to manage the correction of any defects during the defect's correction periods. Those periods will typically last for 52 weeks from the contract Completion date, but some systems contracts have defects correction periods of 70 or 104 weeks.

In the post-Handover period, CRL will act as the point of contact with RFLI and LU for the purpose of:

- deciding whether a defect has been satisfactorily corrected, whether a new or latent defect has emerged, and whether the works contractor or the IM's maintenance contractor should be asked to rectify a defect.
- Conveying instructions to the works contractors, including access and working arrangements.

The default position adopted is that no assignment, novation or transfer of delivery contracts will take place at or prior to Handover, but CRL will confirm this with RFLI and LU when preparing the agreements schedule and if particular circumstances justify an exception, transfer of the relevant agreement to RFLI or LU may occur at Handover.

It will be necessary for TfL, RFLI and LU to decide whether any such assignment, novation or transfer is required before CRL achieves Final Completion under the PDA.

## **7.9 Project Information Migration**

The strategy for the population of the LU and RFLI asset inventory databases is based on a progressive transfer and acceptance approach. Asset information packages will be aligned to sub-elements and progressively transferred to RFLI and LU from design through to the point where asset data is accepted via the Crossrail Asset Data Close Out Process. RFLI and LU will then upload this information into their systems.

Handover of asset information for an Element will be complete once all asset information has been transferred and accepted for that Element. The process for transfer and acceptance of asset information is documented in CRL Project Information Handover Procedure [Ref 62 Project Information Handover Procedure].

The figure below shows a high-level overview of the Asset Information transfer and acceptance process.

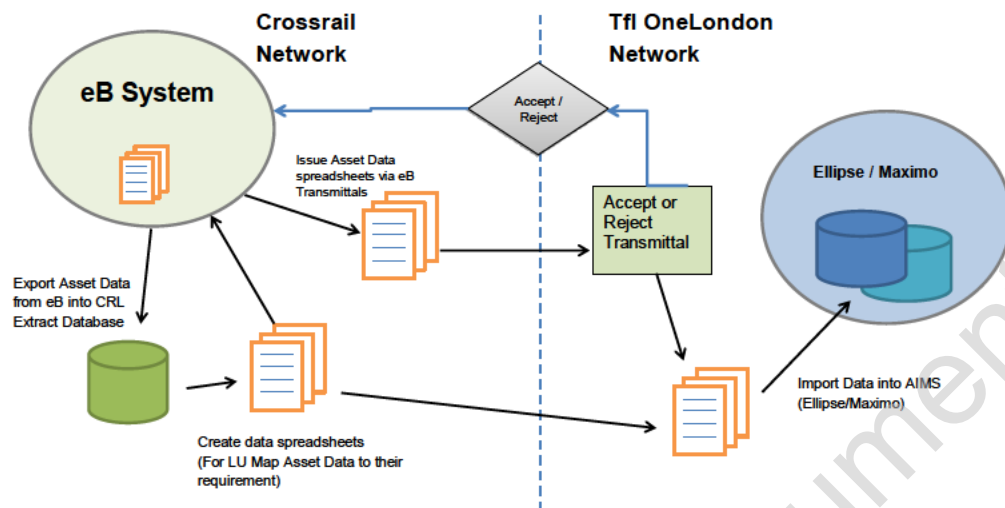


Figure 7.4: Asset Information transfer and acceptance process (high-level view)

CRL will carry out several asset information assurance activities using Verification Activity Plans (VAPS) to ensure that the electronic asset information accurately represents the physical installed assets.

Primary Functional Unit (PFU) lists will be provided at the Final Design Overviews (FDOs). Asset lists will be provided to LU and RFLI once they are agreed to enable them to plan their readiness activities. The breakdown of Elements into sub-Elements will be described within the Element Handover Execution Plans.

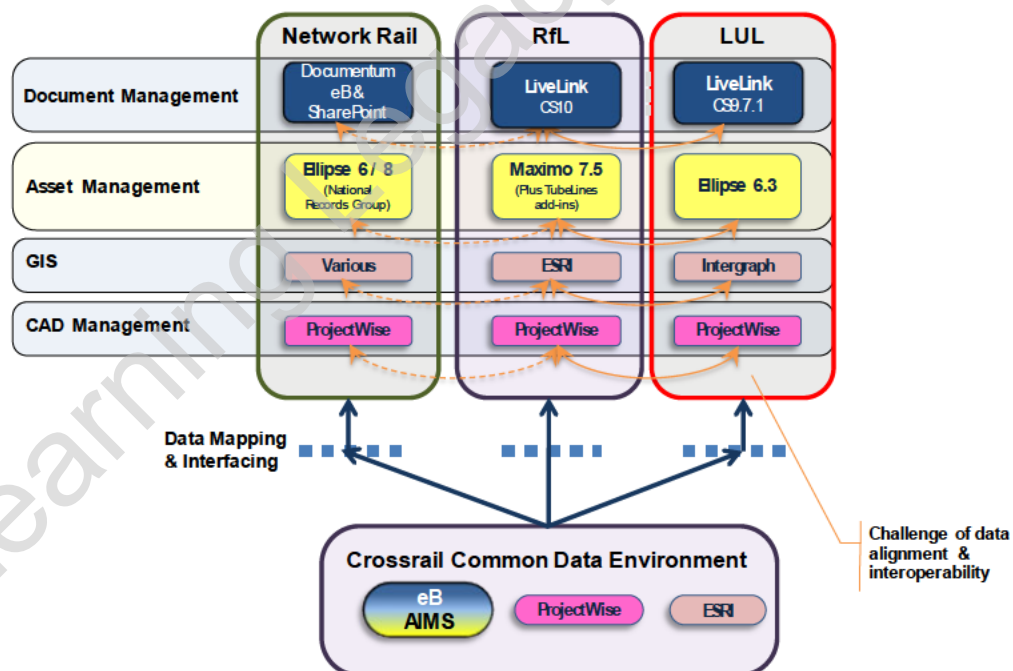


Figure 7.5: Information Handover – Systems Overview

The Project Information Manager will support the Project Managers in managing Contractor’s transfer of documents and data in accordance with the overall Handover Programme. They will support the Project Managers to enable successful data transfer into the AIMS, prior to its mapping and transfer into the LU and RFLI Ellipse or Maximo databases and document transfer into Livelink, as outlined in the Project Information Handover Procedure [Ref 62 Project Information Handover Procedure].

PDF renditions of CAD drawings are part of the Handover documentation progressively transferred to the IM, but the original CAD data files are held in the CRL Projectwise system until completion of the Project, when the CRL Projectwise system will be handed over to TFL. RFLI and LU are expected to have access following transfer [Ref 51 Crossrail CAD Handover Plan].

Similarly, Geographical Information System (GIS) data transfer will be handed over to TFL as described in the GIS Handover Plan [Ref 50 GIS Handover Plan].

## 8 Handover of Other Elements and Project Works

### 8.1 Interface Works

Delivery of the CRL Project requires work activities that occur on or near LU Infrastructure; these works are classified as Interface Works under the LU CRL Development Agreement (DA) [Ref 9 London Underground Limited - Development Agreement].

The Works Package Plan (WPP) & Works Instruction (WI) Procedure (CRL and LU) Ref CRL1-XRL-O4-STP-CR001-50002 details how Interface Works are delivered. The main categories of Interface Work are as follows:

1. CRL delivers the interface works (WPP)
2. LU delivers the interface works on behalf of CRL (WPP)
3. LU manages delivery of the works on behalf of CRL for non-complex activity under £250k and engages a single supplier (WI)

All interface works follow the TfL Pathway process for delivery and handover. All Interface Works must be complete, and handover to LU operations and maintenance must have taken place, prior to CRL Handover. The Procedure for Bringing into Use and Handover of Interface Works to LU Ref CRL1-XRL-Z-GPD-CR001-50021 details the process.

Certain interface works scope involves work that falls within the remit of a TfL Private Finance Initiative (PFI). For these, LU will facilitate the engagement of the PFIs and CRL will be responsible for programming and coordinating the works. The PFIs will be responsible for preparation and delivery of handover in accordance with their PFI contract. Refer to the LUCT Operational Interface Plan [Ref 59 LUCT Operational Interface Plan] and the LU PFI & Third-Party Interface Procedure Ref CRL1-XRL-N2-GPD-CR001-50009 for more detail.

In some cases, CRL has appointed LU to deliver some works which are part of the main works, and therefore defined in the Development Agreement as IM works. In these cases, LU and CRL have utilised the WPP process to agree scope, programme and cost. The TfL Pathway process is followed for the LU delivered IM works but, as the overall accountability for Handover of the Elements is with CRL, the LU delivered work will be integrated by CRL within the associated Elements.

The responsibilities for delivery and handover of LU IM works are shown in the below table (See also Appendix 6):

Physical Assets	Delivered By	Party responsible for Handing over to Operator/Maintainer
Bakerloo Line Link (BLL)*	LUL	LUL
CRL Paddington Station (including installation of CRL equipment within BLL)	CRL	CRL
Tottenham Court Road (Goslett Yard Box)	LUL	CRL
Bond St AP 1	LUL	CRL

Station Operation Rooms (SOR's)		
Legacy/Existing LUL SORI (BOS/TCR/FAR/LIS)	LUL	LUL
Legacy/Existing LUL SORI SMS only (Whitechapel)*	LUL	LUL
Existing SOR in existing LUL Station (Bond St, Tottenham Court Road and Farringdon)		
CRL Equipment in SORI within complete station	CRL	CRL
New SOR in New CRL Station (Liverpool St Station)		
CRL Equipment in SORI within complete station	CRL	CRL
New SOR in New CRL Station (Whitechapel Station)		
CRL Equipment in SORI within complete station	CRL	CRL

**Table 8.1: Summary of LU IM Works showing delivery and Handover responsibility**

\* Note: confirmation required of current responsibilities in relation to the Bakerloo Line Link and Whitechapel SOR

Where LU is responsible for delivery and handover of the work, LU will follow the TfL Pathway process and LU will update systems (Ellipse, Maximo, Projectwise and Livelink) with the required document and data information and ensure the assets are transferred into LU operations and maintenance.

Where LU is responsible for delivery but CRL is responsible for Handover of the work, LU will follow the TfL Pathway process and LU will update systems (Ellipse, Maximo, Projectwise and Livelink) with the required document and data information (validated by the business) but leave it non-operational which effectively means it is not yet handed into operations or maintenance. LU will provide a list of the documentation in MDL format via Document Control to enable CRL integration of the works and incorporation into the Element HMDL which will form part of the Element Handover to LU.

Where CRL have altered assets built by LU, CRL will update LU systems Ellipse, Maximo, Projectwise and Livelink with relevant information as part of the Element Handover process.

## 8.2 Works delivered by TfL PFIs & Pan-TfL Contracts

The following CRL scope is being delivered by TfL Framework Contracts:

- Cubic: Automatic Fare Collection (AFC) including gate lines, ticket machines, and cabling;
- Capita: TfL Information Management, including the core network which supports AFC, Wi-Fi and Advertising together with the physical Wi-Fi infrastructure.
- Connect: Staff radio, Tetra, London Fire Brigade and Emergency Services propagation; and

These TfL contracts include design, build and maintenance. Therefore, Handover into maintenance will be an internal transaction within the Framework Contract.

TfL Framework contractors are responsible for providing assurance during the design and construction phase of their works. CRL are responsible for demonstrating Framework contract works are integrated with the CRL works, including demonstration of safety and operability.

CRL are responsible for programming and coordinating these works. The Framework Contractors are responsible for preparation and delivery of the scope to CRL to match Handover of the Elements.

The following scope is being delivered by contractors originally procured through two Pan TfL Agreements:

- Kone: Lifts
- Otis: Escalators.



The design, manufacture, installation and commissioning of Lifts and Escalators are being delivered through individual subcontracts with each Tier 1 Station, Shaft and Portal contractor – this is through a standard subcontract template within the Pan TfL Agreements and instructions issued by CRL to each Tier 1 to enter into contract with a nominated subcontractor.

The Pan-TfL Lifts and Escalator contracts include long term maintenance which will be directly implemented with TfL after handover of the assets by CRL.

The Pan-TfL contractors are responsible for providing full assurance during the design, manufacturing and construction phase of their works through their Tier 1 subcontract employers, who in turn are responsible for providing this assurance as part of their Station, Shaft or Portal Crossrail Works Information requirements. i.e. no different to any other works that the Tier 1 Contractor are directly performing.

### **8.3 Works delivered by NR**

NR is responsible for delivering the following scope:

- Great Eastern (GE) and Great Western (GW) mainline railway system works;
- GE and GW station works;
- Heathrow Spur;
- Line of route systems (e.g. DOO CCTV, Telecoms / SCADA and station systems);
- CRL South-East (SE) infrastructure, including Abbey Wood Station; and
- Infrastructure protection and enabling works to support Central Operating Section (COS) delivery (excluded from this Handover Strategy and Plan).

Handover of GE and GW mainline railway systems works will take place from NR Project to NR Route using NR GRIP standard NR/L2/EBM/088. Design coordination with the COS will be undertaken through Interface Control Documents (ICDs). The CRL Engineering Safety Management team will review for hazard transfer and compatibility at the COS/NR interfaces in conjunction with RFLI and use this information to update the consolidated safety justification for the COS.

Handover of GE and GW station works will take place from the NR Project to the SFO holding the lease from NR using NR GRIP standard NR/L2/EBM/088 and NR-TOC lease arrangements. The SFOs will be the Train Operating Company (TOC) franchise (e.g. Abellio Greater Anglia or Great Western Railway) or MTR[C] (the Crossrail Train Operating Company (CTOC)) depending on the surface station. Whilst legacy infrastructure may be the subject of changed management responsibilities, such as stations leased to RFLI, the applicable lease obligations, not project processes, will cover the transfer of information relating to such infrastructure. Assurance of end-to-end railway systems (communications and signalling) will also be done via Interface Control Documents, interface hazards assured, and the safety justifications signposted within the Railway Infrastructure End-to-End Safety Justification.

Handover of the Heathrow Spur will take place from NR Project to Heathrow Airport Limited (HAL) following NR GRIP and the HAL Assurance Review Panel (HALARP) process. Bringing Into Use (BIU) will follow the completion of the project works and commissioning of the assets. The Heathrow Airport Limited (HAL) Safety Justification will be referenced within the CESAC.

Handover of Line of Route systems include for DOO CCTV, Telecoms and SCADA, and other station systems, that are end-to-end systems connecting into the RCC. The arrangements for each vary, as described in their Interface Control Documents, but connection, maintenance and operation arrangements, will need to be in place for Handover to RFLI, which will also follow the NR GRIP process aligned to CRL by NR amending the forms and templates as required.

Handover of the South East Spur and Abbey Wood is described in more detail in Section 7.4.

See Appendix 8: Surface: Engineering, Construction, Completion, Handover and Assurance RACI Summary for further information.

#### 8.4 South-East Spur and Abbey Wood Station

The South East Spur comprises modifications to the existing North Kent Line (NKL), new COS infrastructure and the re-built Abbey Wood Station.

The South East Spur infrastructure and Abbey Wood Station should each be considered separately as the delivery and timing of handover for each is different:

1. South East Spur infrastructure is being constructed by both NR and CRL but will form part of the Central Operating Section that will be handed over as one routeway by CRL to RFLI (who will become the Infrastructure Manager).
2. Abbey Wood Station is being constructed and handed over by NR. Handover will be undertaken directly by NR to MTR. NR will remain as Freeholder, with long-term maintenance responsibility, but with an NR Handover process to facilitate the concessionaire (MTR) becoming the sub-lessee with IM responsibility.

For the South East (SE) Spur routeway, where NR is managing the delivery, NR will follow its own internal bringing into use procedures for the works before granting access to CRL's contractors to complete systems installation and energise the overhead line electrification. Once Dynamic Testing is complete, Crossrail will be required to handover the completed routeway assets on the SE Spur as a fully integrated part of the "COS Tunnel (and Structures)" and the "Railway Systems" Elements.

For Abbey Wood station, where NR is undertaking works, these will be handed over by NR to the SFO which will be MTR [Crossrail]. Railway systems will also be installed by CRL within Abbey Wood station, including the Signalling Equipment Room (SER) and Communications Equipment Room (CER), the CRL platforms, platforms communications (CCTV, CIS, PA, Help points), Overhead electrification and CMS.

In respect of the nine requirements of Handover, the following should be noted on the SE Spur and Abbey Wood:

- **Handover documentation:** CRL will demonstrate that all relevant safety assurance is in place to support RFLI acceptance. This will include appropriate certification and evidence that demonstrates that the full suite of assets delivered on the SE Spur, including the NR works, rolling stock and CRL signalling operate safely as a single system to the required performance level. Safety evidence for the SE Spur will be supplied by both NR and CRL's contractors, and the close out of interface hazards will be done through Systemwide. The overall safety case will form part of the consolidated safety justification for the Central Operating Section.
- **Agreements (legal/property):** all outstanding commitments and obligations, including the overall asset ownership boundaries and associated agreements, must be closed and resolved at Handover. All land taken temporarily by CRL on behalf of NR must be handed back, and all ongoing liabilities must be defined and passed onto RFLI.
- **Agreements (regulatory approvals):** NR will seek Authorisation to Place into Service (APIS) for the infrastructure subsystem on the SE Spur. CRL will seek APIS for the Command Control and Signalling (CCS) subsystem, and the Energy subsystem, where NR will provide the necessary evidence to CRL who will compile the Technical File. NR will provide the Technical File for Abbey Wood in accordance with the Passengers of Reduced Mobility (PRM) TSI.
- **Training is in place:** CRL will facilitate coordination of training plans with RFLI. Familiarisation of equipment, operations and maintenance manuals will be provided by CRL, NR and Balfour Beatty. NR will train RFLI/MTR on their SE Spur installed scope, and CRL will train RFLI/MTR on their installed routeway systems.

- **Warranties and defect liabilities:** NR is the management entity that has contracted delivery of its works through Balfour Beatty. This contract will require ongoing management by NR on behalf of CRL/RFLI through the period of defects liability for the assets created by NR.
- **Asset inventory database:** Conversion of NR asset information on the SE Spur from the NR format into the CRL format will be undertaken so that RFLI is dealing with the exactly the same information as the rest of the COS Railway Systems Element upon Handover.

Further information on management of delivery and Handover of the SE Spur is defined in the Railway Systems Handover Execution Plan [*Ref 67 Railway Systems Handover Execution Plan*] that contains a chapter clarifying roles and responsibilities.

## 8.5 Rolling Stock and Depots

The Rolling Stock and Depots have been procured through TfL and will operate their own technical assurance plan. The Rolling Stock and Depots will be required to provide evidence to CRL to facilitate integration assurance.

### Rolling Stock Handover

The procedure for the handover of rolling stock may be found in Clause 21 of the Rolling Stock and Depot Service Provision Agreement (RSPA) [*Ref 36 Rolling Stock and Depot Service Provision Agreement (RSPA)*]. The provisions relating to operation of the rolling stock by Bombardier are to be found in Schedule D of the RSPA.

Readiness to operate and maintain the rolling stock requires the availability of sidings/depots at Plumstead, Gidea Park, Maidenhead and Shenfield, and Depots at Ilford and Old Oak Common.

RFLI will not be in a position to accept the Rolling Stock and Depots unless compatibility with the Central Operating Section and Network Rail surface routes has been demonstrated, which requires CRL input.

### Old Oak Common Depot

The Old Oak Common depot land is leased by TfL from NR on a long lease (125 years from 1994). RFLI have licensed use of the depot to the Service Provider (SP) Bombardier, to build and operate a new depot facility on the site.

There is therefore no handover relevant to the depot, however there is 3-step staged 'acceptance' on completion of works. The depot is then operated by Bombardier for the period of their licence (32 years).

The depot acceptance procedure may be found in clause 15 and in schedules C6 and C7 of the Rolling Stock and Depot Service Provision Agreement (RSPA) [*Ref 36 Rolling Stock and Depot Service Provision Agreement (RSPA)*]. The provisions relating to operation of the Old Oak Common depot by Bombardier are to be found in Clause 30 and Schedule D of the RSPA.

### Ilford Yard Sidings

Ilford depot is subject to major CRL works under contract C828. As a brief description it includes:

- Paint shop, logistics & stores, workshop 'A' upgrade, wheel lathe road embedded track, external car park and sub-station;
- Depot training centre;
- Plessey Rd electrification;

- Operations and welfare buildings and;
- 10 new 205m sidings;

The handover of the above shall be as shown in Appendix 3.

### **Yellow plant**

Yellow Plant is defined as:

- Engineering Trains;
- Railway maintenance inspection trains / vehicles / units;
- Railway maintenance task delivery trains / vehicles / units;
- Rail borne Plant; and
- Intermediate wagons / vehicles.

The CRL designer will determine the Yellow Plant required for inspecting and maintaining the CRL Routeway in accordance with the CRL RAM requirements. The Yellow Plant required for inspecting and maintaining the CRL railway infrastructure shall be fully specified as part of the CRL design works, including what the Yellow Plant will need to be, why it is needed, how it will deliver the output, where and when it shall be used in accordance with interventions determined by Standards, CRL RAM requirements and/or manufacturer recommendations.

CRL will include the necessary testing and commissioning of the Yellow Plant into the readiness for operations plan such that RFLI can be fully competent (including depots; plant servicing, maintenance, deployment, operations and planning staff) to deliver Yellow Plant inspection and maintenance works to the CRL.

The Yellow Plant shall be accepted directly from the Yellow Plant Supplier to RFLI without the intervention of CRL. The handover date for the Yellow Plant shall support Stage 3.

RFLI will determine the deployment and operations of the Yellow Plant.

## **8.6 Land and Property**

### **Over site developments**

The CRL stations and central shafts have been designed to incorporate Over Site Developments (OSD) above, and to some extent integrated within, the new CRL works. The commercial terms, developers' obligations and safeguards protecting the railway during construction of the OSD will be included within Development Agreements negotiated between TfL and the developers. The terms for long term occupation of the new developments are contained within the leases of the new developments. The development rights are effectively agreed at the contract stage and are set on completion of these legal agreements. In working up these agreements close co-ordination is required with LUL Infrastructure Protection, LUL and RFLI as appropriate to ensure that all the various rights and reservations tie in with TfL's overall operational requirements to run the railway. Where CRL works include OSD facilities (typically basement areas, retail units, service/refuse yards, OSD escape walkways and OSD transformer rooms) or temporary works, such as holding down bolts for OSD construction cranes, they shall be maintained and made secure by the future IM of the Element LUL/RFLI until such time as a developer for that site is engaged.

### **Urban Realm**

Along the central section of the route the great majority of land on which CRL will be implementing its reinstatement and urban realm designs is adopted public highway. This will need, on completion of the

work, to be handed back to the local authority. A Programme and process will be required for handing the land back to the local authority.

There is at least one instance where the urban realm improvement is on private land which will need to be handed back to the private owner (British Land at Liverpool St).

On the surface section, where NR is carrying out work beyond the station boundary (there are about 10 stations where this is the case) similar arrangements will be necessary with the local authorities.

Within the local authority owned areas there are lines of security bollards which will need to be maintained and replaced if damaged. Maintenance arrangements will need to be agreed with LU through the Maintenance Steering Group [*Ref 19 CRL Maintenance Steering Group Terms of Reference*].

### **Land Management**

Having acquired all the land needed to construct CRL, the Land Management team is responsible for planning for the long-term transition of CRL's property assets. For instance, land transfers will be necessary, from TfL to Network Rail, and vice versa to ensure the division of ownership and maintenance is operationally optimal. Working assumptions about property and asset ownership on a high level across the route are set out in the 'Infrastructure Manager Property' route map and is being updated progressively.

Title information for all land acquired for CRL is currently held both by CRL in the Titles Management System and by TfL Operational Property in their property asset register.

### **Estates Management**

CRL Estates are required as part of the Estates Management Plan [*Ref 42 Estates Management Plan*] to administer the Final Handback (FHB) of land. The FHB records the final lands exchange for that area where the very last contractor in occupation for CRL permanent vacates before handing the area back to CRL Estates.

Estates will then hand the site back to TfL to dispose of or, where appropriate, to the relevant Over Site Development partner. Alternatively, the site may be handed back to the Infrastructure Manager to operate. Where land has been acquired temporarily under Section 5 of the CRL Act then the land will be handed back to the original owner/occupier in the condition agreed with the landowner(s) and the relevant planning authority.

## Appendix 1 – Reference Documents

Ref	Title	Number
1	Asset Information Management Framework	CRL1-XRL-Z3-STP-CR001-50002
2	CR-STD-015 Asset Identification Standard	CRL1-XRL-O6-STD-CR001-00031
3	Asset Information Provision Procedure	CRL1-XRL-Z3-GPD-CR001-50004
4	Asset Data Dictionary Master Configuration	CRL1-XRL-Z3-ADDSD-CR001-50186
5	Crossrail Test and Commissioning Strategy (Introduction)	CRL1-XRL-R-STP-CR001-50002
6	Project Testing and Commissioning Strategy	CRL1-XRL-O8-STP-CR001-50008
7	Crossrail Trial Running Strategy	CRL1-XRL-R-STP-CR001-50001
8	CRL/LU Works Package Plan and Works Instruction Procedure	CRL1-XRL-O4-STP-CR001-50002
9	London Underground Limited- Development Agreement	CR-XRL-Z8-AAG-CR001-00120
10	DLR/CRL Works Agreement	CRL1-XRL-Z8-AAG-CR001-00009
11	Crossrail Delivery Strategy	CR-XRL-Z-GST-CR001-00001
12	IM Boundary Document	CRL1-XRL-O8-XTC-CR001-00005
13	Network Rail Crossrail Programme Technical Assurance (TAP)	CRL1-NRI-N2-STP-CRG04-50016
14	Technical Assurance Plan (TAP)	CRL1-XRL-O7-STP-CR001-50003
15	Master Assurance Deliverables List (MADL)	CRL1-XRL-K1-MDL-CR001-50001
16	LU Letter G22-746 - Engineering Safety Management System Safety Plan	CRL1-LU-O7-CIL-CR001-50001
17	Not used	
18	Bringing Into Use (BIU) Roadmap	CRL1-XRL-K2-STP-CR001_Z-50001
19	CRL Maintenance Steering Group Terms of Reference	CRL1-XRL-O8-GUI-CR001-50003
20	Procedure for Bringing into Use and Handover of Interface Works to LU	CRL1-XRL-Z-GPD-CR001-50021
21	PAS 1192-2 Specification for Information Management for the Capital / Delivery Phase of Construction Projects Using Building Information Modelling.	<a href="http://shop.bsigroup.com/forms/PASs/PAS-1192- 2/">http://shop.bsigroup.com/forms/PASs/PAS-1192- 2/</a>
22	PAS 1192-3 (BIM) Specification for Information Management for the Operational Phase of Construction Projects Using Building Information Modelling.	<a href="http://shop.bsigroup.com/forms/PASs/PAS-1192- 3/">http://shop.bsigroup.com/forms/PASs/PAS-1192- 3/</a>
23	Project Delivery Agreement (PDA)	CR-XRL-Z8-AAG-CR001-50178
24	On Network Functional Requirements (ONFR)	CRL1-XRL-O8-RRS-CR001-00001
25	Crossrail Highways and Traffic Consents Register (HTCR)	CRL1-PDP-T3-QAP-CRG03-00120
26	Planning Consents register- Central	CRL1-XRL-T-LCR-CRG03-00001
27	Planning Consents Register - Surface (Network Rail)	CRL1-XRL-T-LCR-CR001-00002
28	Environmental Consents Register	CRL1-XRL-T1-LCR-CR001-00001
29	Construction Interface Management Procedure	CRL1-XRL-N2-GPD-CR001-50006
30	UK Government Construction Strategy (BIM)	<a href="https://www.gov.uk/government/publications/government-construction-strategy">https://www.gov.uk/government/publications/government-construction-strategy</a>
31	Handover Procedure of Crossrail Elements to IMs	CRL1-XRL-Z-GPD-CR001-50026
32	RAB(C) Terms of Reference	CRL1-RFLI-O-GPD-CR001-50001
33	Employer's Completion Process	CRL1-XRL-O4-GPD-CR001-50018
34	Completion of the Works (Project Manager's Duties)	CRL1-XRL-O4-GPD-CR001-50017
35	Snagging and Outstanding Works (Punchworks) Procedure	CRL1-XRL-O4-GPD-CR001-50010
36	Rolling Stock and Depot Service Provision Agreement (RSPA)	CRL1-XRL-Z8-AAG-CR001-50248

Ref	Title	Number
37	Crossrail Assurance Reporting Environment (CARE): User Guide	CRL1-XRL-O7-GUI-CR001-50004
38	Verification and Validation Plan	CRL1-XRL-O8-STP-CR001-50006
39	RP4 Baseline CommentaryFinal Redacted	CR-XRL-Z9-GGG-CR001-00001
40	Not used	
41	Element Completion Handover Certificate *	CRL1-XRL-K1-CER-CR001-50001
42	Estates ManagementPlan	CR-XRL-T2-STP-CR001-50003
43	Agreement ManagementPlan Overview	CR-XRL-V-GPS-CR001-50001
44	Operations - MTR Staged Opening Plan	CRL1-XRL-K2-STP-CR001_Z-50002
45	CRL MaintenanceDevelopment Plan	CRL1-XRL-O8-XTC-CR001-00006
46	Information Progressive Acceptance Schedule	CRL1-XRL-Z3-TSC-CR001-50007
47	LU Assurance Standard	S1538
48	Engineering Safety Management - System Safety Plan	CRL1-XRL-O7-GST-CR001-00001
49	Element Completion Handover Report *	CRL1-XRL-K1-RGN-CR001-50002
50	GIS Handover Plan	CRL1-XRL-Z3-STP-CR001-50019
51	Crossrail CAD Handover Plan	CRL1-XRL-Z3-GPD-CR007-50015
52	CRL/RFLI Memorandum of Understanding	CR-XRL-Z8-AAG-CR001-50468
53	Staged Completion Report*	CRL1-XRL-O7-RGN-CR001-50005
54	LUCT Crossrail Stations Handover Routemap	CRL1-LU-T-DWG-CR001-50001
55	ORR Rail Maturity Model (RM3)	<a href="http://orr.gov.uk/_data/assets/pdf_file/0013/2623/management-maturity-model.pdf">http://orr.gov.uk/_data/assets/pdf_file/0013/2623/management-maturity-model.pdf</a>
56	Acceptance by ORR of CRL's Dynamic Testing Regime principles	CRL1-XRL-O-COL-CR001-50007
57	VAP Implementation and Progressive Acceptance Procedure	CRL1-XRL-O7-GPD-CR001-50021
58	Crossrail Handover Information Plan	CRL1-XRL-Z3-STP-CR001-50015
59	LUCT Operational Interface Plan	CRL1-XRL-N2-STP-CR001-50003
60	Integrated Handover RACI*	CRL1-XRL-K1-LRG-CR001-50002
61	FDO Element Definition	CRL1-XRL-O8-LRC-CR001-50038
62	Project Information Handover Procedure	CRL1-XRL-Z3-GPD-CR001-50016
63	Crossrail Handover Information Plan	CRL1-XRL-Z3-STP-CR001-50015
64	Crossrail Engineering Safety and Assurance Case Strategy	CRL1-XRL-O8-STP-CR001-50030
65	High-Level Strategic Plan for End to End Railway Regulatory Approvals	CRL1-XRL-Z-STP-CR001-50024
66	Crossrail Acceptance and Regulatory Authorisations Programme - PEP	CRL1-XRL-O8-STP-CR001-50019
67	Railway Systems Handover Execution Plan	CRL1-XRL-O8-STP-CR001-50025
68	Training Strategy and Plan Template and Guide	CRL1-XRL-Z-GUI-CRG03-50010
69	Readiness Gates Procedure	CRL1-XRL-O-GPD-CR001-50006
70	RFLI Mobilisation Plan	TBC
71	LU Readiness Plan	LUCT-GEN-BMG-PLN-00006
72	Initial Spares Required for Crossrail	CRL1-XRL-O8-STP-CR001-50040
73	Handover Master Deliverables List (HMDL) baseline	CRL1-XRL-N2-LRG-CR001-50001
74	Crossrail Migration Plan - Configuration Description	CRL1-XRL-O8-STP-CR001-50166
75	Crossrail Overall Migration Plan	CRL1-XRL-O8-STP-CR001-50165

\*denotes this document/template is under development and yet to be agreed. Where the eB reference has an unapproved status, it is anticipated to reach approval within 12 months of publishing this Strategy Document on CMS.

## **Appendix 2 – Handover Definitions**

Learning Legacy Document



Term	Source	Definition
Advance Works	CRL	Construction works completed ahead of Stages 0 to 5
AIMs	CRL	Asset Information Management Systems
AIR	CRL	Asset Information Requirements
AMP	CRL	Agreements Management Plan (CRL) Asset Management Plan (NR)
ARM	ARM	Active Risk Manager
APD	LU	Asset Performance Directorate, responsible for maintenance
AsBo	RIR	Assessment Body
APIS	RIR	Authorisation to place into service
BIU	CRL/LU	Bringing into Use. The term BIU can refer to the milestone at which an asset or group of assets are brought into operational use and maintenance, or it can also refer to the process by which assets become operational. Bringing Into Use may be staged to reflect the progressive completion of the works, i.e. there may be several BIU stages leading up to Handover.
BCV	LU	Bakerloo, Central and Victoria lines
CARE	CRL	Crossrail Assurance Reporting Environment
CDS	CRL	Commitments Delivery System
CEG	CRL	Chief Engineers Group
CER	CRL	Communications Equipment Room
Central Core Area	PDA	The part of the Central Operating Section between (i) Royal Oak (in the City of Westminster) and Pudding Mill Lane (in the London Borough of Newham) and (ii) Royal Oak (in the City of Westminster) and Plumstead (in the London Borough of Greenwich).
Central Core Area Infrastructure	PDA	New tunnels and the new tracks, signalling, utility and other railway infrastructure and systems to be developed in the Central Core Area other than the Central Operating Section Stations.
Central Core Area Works	PDA	Crossrail Project Works being carried out under the PDA between (i) Royal Oak (in the City of Westminster) and Pudding Mill Lane (in the London Borough of Newham) and (ii) Royal Oak (in the City of Westminster) and Plumstead (in the London Borough of Greenwich).
Central Operating Section (COS)	PDA	Means the part of the Crossrail Network between (i) Royal Oak (in the City of Westminster) and Pudding Mill Lane (in the London Borough of Newham) and (ii) Royal Oak (in the City of Westminster) and Abbey Wood (in the London Borough of Greenwich), the exact parameters of which shall be determined pursuant to the Sponsors Requirements.
CDE		The Common Data Environment (CDE) is the single source of information for the project, used to collect, manage and disseminate documentation, the graphical model and non-graphical data for the whole project team.
CDT	CRL	Commitments Delivery Tracker
CHIP	CRL	Crossrail Handover Information Plan
CMCM	LUL	Crossrail Maintenance Cost Model
CMDL	CRL	Contract Master Deliverables List
Commercial Close-out	Contract Admin Manual 3.0	Conclusion of the contract, including: - final accounts; completion certificates; outstanding defects; collateral agreements; insurance issues
Completion	NEC	Completion is when the Contractor has - done all the work which the Works Information states he is to do by the Completion Date and - corrected notified Defects which would have prevented the Employer from using the works and Others from doing their work. If the work which the Contractor is to do by the Completion Date is not stated in the Works Information, Completion is when the Contractor has done all the work necessary for the Employer to use the works and for Others to do their work.
COO	LU	Chief Operations Officer
COS Routeway	CRL	Defined as the Central Operating Section Portals, Shafts, Tunnels, Railway Systems, Westbourne Park, Plumstead Sidings and Maintenance Facility
CRL	CRL	Crossrail Limited
Crossrail		The new railway authorised by the Crossrail Act and including the infrastructure systems and rolling stock.
Crossrail Environmental Minimum Requirements (EMR)	PDA	This means the requirements set out in the following documents; • Environmental Minimum Requirements – General Principles – Version 5- dated 22 July 2008, paragraphs 1.5 and 3.6 to 3.10; • The undertakings and assurances concerning the Crossrail Project specified in the Crossrail Register of Undertakings and Assurances published by the DfT; and • EMR Annex 2 – Planning Memorandum – Draft 4.0 – dated 2 November 2007;
CCSC	CRL	CRL Commercial Sub-Committee
CSM Regulations		Common Safety Method Regulations
CSM-RA		Common Safety Method on Risk Evaluation and Assessment
CTOC	RFLI MoU	The train company to be appointed by RFLI to operate Crossrail services, including the operation of services on the Heathrow to Paddington and Shenfield to Liverpool Street routes prior to full opening of Crossrail. Now confirmed as MTR Crossrail Development Agreement between Crossrail and LU (ref. CR-CO-PRW-X-AE-00004)
DA	CRL/LU DA	
Defect	NEC	A Defect is - a part of the works which is not in accordance with the Works Information or - a part of the works designed by the Contractor which is not in accordance with this contract or the Applicable Law or the Contractor's design which the Project Manager has accepted.
Defects Certificate	NEC	The Defects Certificate is either a list of Defects that the Supervisor has notified before the defects date which the Contractor has not corrected or, if there are no such Defects, a statement that there are none.
DeBo	RIR	Designated Body
DFO		Depot Facilities Operator
DRACAS		Data Reporting Analysis and Corrective Action Systems
DRACCT	LUL Assurance Standard S1538	Directors Risk, Assurance and Change Control Team
DOO		Driver-Only Operation
Dynamic Testing	PDA	The stage of testing that requires the movement of trains to demonstrate those functions that cannot be fully demonstrated by static testing alone as part of the Assurance Process.
ECHC	CRL	Element Completion Handover Certificate
ECHR	CRL	Element Completion Handover Report
ECP	CRL	Employers Completion Process
EDMS	CRL	Electronic Data Management System
EMS	CRL	Estates Management System
EMP	CRL	Estates Management Plan
Element	PDA	Subject to Clause 16.2(c)(i), CRL shall procure the handover of groups of assets and/or systems (each such group constituting an "Element" of the Railway) to the relevant Operator after satisfactory completion of Dynamic Testing in respect of each such Element in accordance with the Assurance Process (a "Handover").
Ellipse	LU	Ellipse is LU's asset management database and scheduling tool. It is used by LU APD to keep track of maintenance activities. It is the single source of truth for LU asset and the record of maintenance.
FDS	CRL	Final Design Statement
Final Completion	PDA	This means the satisfaction of the Final Completion Criteria
Final Completion Certificate	PDA	CRL shall issue a certificate to the Sponsors specifying the date upon which it achieved Final Completion (the "Final Completion Certificate") no later than five Working Days after achievement of Final Completion.
Final Completion Criteria	PDA	Final Completion in respect of the Railway, shall occur once the following criteria (the "Final Completion Criteria") have been met: (i) all then current manufacturer or design/construction warranties in respect of the Railway have been novated or assigned to the relevant Operator; and (ii) all obligations of CRL pursuant to this Agreement have been fully and finally discharged.
Final Completion Date	PDA	This means the date at which Final Completion occurs as certified by CRL and endorsed by the Sponsors in accordance with Clause 16.5(b) [of the PDA]
FHB	CRL	Final Handback and is a term used by CRL's Land and Property department
Final Delivery Date	PDA	The date on which Substantial Completion occurs in respect of the last Element of the Railway as certified by CRL and endorsed by the Sponsors pursuant to PDA Clause 16.3(c)
Finally Complete	LU DA	"Finally Complete" means completion of the whole of the relevant works as described in the relevant Works Documents, so that they are available to be taken into use by LUL or CRL (as the case may be) and are in a safe condition including the completion of Snagging items, and "Final Completion" shall be construed accordingly.
GIS		Geographic Information Systems
HAL	N/A	Heathrow Airport Limited
Handover	Several	PDA Clause 16.2(a): Subject to Clause 16.2(c)(i), CRL shall procure the handover of groups of assets and/or systems (each such group constituting an "Element" of the Railway) to the relevant Operator after satisfactory completion of Dynamic Testing in respect of each such Element in accordance with the Assurance Process (a "Handover").  RFLI MOU Schedule 1, Page 24: is the handover by CRL and the acceptance by RFLI of an Element after satisfactory completion of Dynamic Testing of each such Element in accordance with the Assurance Process.
HTCR	CRL	Highways and Traffic Consents Register

Infrastructure Manager (IM)	ROGS	"infrastructure manager" means the person who— (a) in relation to infrastructure other than a station, is responsible for developing and maintaining that infrastructure or, in relation to a station, the person who is responsible for managing and operating that station, except that it shall not include any person solely on the basis that he carries out the construction of that infrastructure or station or its maintenance, repair or alteration; and (b) manages and uses that infrastructure or station, or permits it to be used, for the operation of a vehicle.
Interim Acceptance	Handover Strategy	A precursor to Handover intended to protect the achievement of a "high quality" Handover. Interim Acceptance formally assesses the Handover readiness of an Element at a suitable time prior to the scheduled Handover milestone, recording an agreed position of the Handover deliverables completed and accepted by the Ms and capturing an agreed list of outstanding deliverables that will need to be accepted in order for the Element to successfully achieve its Handover criteria.
ISV		Intermediate Statements of Verification
Interface Works	LU DA	"Interface Works" means works and services in relation to the Crossrail Project that are on or impact on or are in the vicinity of LUL Property or (to the extent not included in the foregoing) systems forming part of or interfacing with the Underground Network (including without limitation protective works required as a result of the Crossrail Project) as described in the Interface Scope Schedule from time to time
IP		Infrastructure Protection
JNP	LU	Jubilee, Northern, Piccadilly lines
Key Date	NEC	A Key Date is the date by which work is to meet the Condition stated. The Key Date is the <i>key date</i> stated in the Contract Data and the Condition is the <i>condition</i> stated in the Contract Data unless later changed in accordance with this contract.
LUL Crossrail Stations	LU DA	"LUL Crossrail Stations" means the new and modified parts of the stations at Bond Street, Tottenham Court Road, Farringdon (including Barbican), Liverpool Street (including Moorgate) and Whitechapel developed as a result of the Crossrail Project.
LUL Interface Works	LU DA	"LUL Interface Works" means those Interface Works and ancillary services to be performed and/or procured by, and ancillary deliverables to be produced and/or procured by, LUL pursuant to this Agreement.
MA D	LU	Mandatory Asset Information Deliverables (MAID) list. MAID is an agreed list of deliverables for APD/CPD prior to acceptance and handover as well as health and safety file information required for compliance with the CDM Regulations.
MDL	CRL	Master Deliverables List
M RP	CRL	Maintenance Integration Review Panel
MOSH	CRL	Master Operation Handover Schedule
NDMs	NR	Network Delivery Managers
NKL	NR	North Kent Line
NNTR		Notified National Technical Rules
NoBo		Notified Body
Nominated Undertaker	CRL	The organisation or organisations which will be appointed by the Secretary of State to design construct operate and maintain Crossrail
O R	CRL	Organisation Information Requirements
ORR		Office of Road and Rail
ONFR	NR	On Network Functional Requirements
OSD	CRL	Over Site Development
Pathway	TfL	Pathway is TfL's framework to provide the tools to delivery teams and their stakeholders to work effectively. Pathway is part of the TfL Management System used to manage and control specific programme, project and delivery portfolio scenarios
PA	LU	Public Address
PDA	CRL/Sponsors	Project Delivery Agreement
Practical Completion	LU DA	"Practically Complete" means completion of the whole of the relevant works as described in the relevant Works Documents, so that they are available to be taken into use by CRL or LUL (as the case may be) and are in a safe condition notwithstanding the existence of Snagging Items, and "Practical Completion" shall be construed accordingly.
PWHR		Project Wide Hazard Record
RAB[C]		Railway Assurance Board [Crossrail]
RCC		Route Control Centre
RINF		Register of Infrastructure
RIR		Rail Interoperability Regulations
RRV	NR	Road Rail Vehicles
ROGS		Railways and Other Guided Transport Systems
RP4	CRL	Review Period 4
RSPA	CRL	Rolling Stock and Depot Service Provision Agreement
SCADA		Supervisory Control and Data Acquisition
SE		South East
SER	LU	Signalling Equipment Room
SIMS		Service and Infrastructure Managers
SFO		Station Facility Owner
Snagging Items	LU DA	"Snagging Items" means minor items of outstanding work that would not normally impair the use of the relevant assets for their intended purpose.
SMS	ROGS	Safety Management System
SMDL	CRL	Systemwide Master Deliverables List
SoS		Secretary of State
SSL	LU	Sub Surface Lines
Stage 3 Handover	Exec paper 23 January 2013	Defined as occurring at the end of Dynamic Testing. CRL cease to have responsibility for (i) care and maintenance and (ii) control and management of the central section. SMS / ROGS rules now apply
Stage 3 Passenger Service Start:	Bringing into use roadmap rev 4.0	Start of passenger service for stage 3
Stage 3 Substantial Completion	PDA clause 16.3	See "Substantial Completion" Table 4.2 of RP4 baseline commentary: "Central Operating Section substantially complete and available for trial operations. Route Control Centre substantially complete and staffed to support trial operations."
Station contract completion	Station contract	Completion of all the work which the Works Information states the contractor is to do by the completion date and correction of Notified Defects which would have prevented the Employer from using the Works or Others from doing their Work.
Substantial Completion	PDA	This means in respect of an Element or group of Elements the satisfaction of the Substantial Completion Criteria
Substantial Completion Certificate	PDA	A certificate CRL issue to the Sponsors when it considers that it has achieved Substantial Completion in respect of an Element or group of Elements (a "Substantial Completion Certificate") together with all required supporting evidence. The Sponsors shall review such evidence and shall only be permitted to refuse to endorse a Substantial Completion Certificate if they consider, acting reasonably, that there is insufficient evidence of confirmation from each relevant Operator and CRL that the Substantial Completion Criteria have been satisfied in respect of the relevant Elements.
Substantial Completion Criteria	PDA	Substantial Completion Criteria include that: (i) CRL has provided to the Sponsors the relevant certificates of Handover (and associated snagging lists) jointly signed by CRL and the relevant Operators evidencing that CRL has handed over each such Element in full to the relevant Operators for use in Trial Operations; (ii) CRL has complied in full with the Assurance Process, including satisfactory completion of Trial Running, and has provided to the Sponsors all relevant certificates of assurance and the associated snagging lists in relation to each such Element; (iii) CRL has provided the Sponsors with sufficient evidence of confirmation from each relevant Operator that clauses 16.3(iii) A-F have been satisfied (iv) CRL has complied, to the extent relevant to each Sponsor, with Clause 19 in respect of that Element or group of Elements.
TAP	CRL	Technical Assurance Plan
Takeover		Occurs when the contractor has completed the works and hands the assets to CRL
Testing	PDA	This means demonstrating that the assets and integrated systems comprising the Crossrail Project perform in accordance with CRL's obligations under this Agreement, the Crossrail Programme Functional Requirements and the Sponsors Requirements
Trial Operations	PDA	This means the undertaking by the Operators of tests and trials to prepare for and demonstrate that they are capable of operating the Railway in accordance with the Sponsors Requirements and the Operators' Safety Management Systems.
TM		Traffic Manager
Trial Running	PDA	This means the integrated testing of each Element, developed by CRL as part of the Assurance Process to demonstrate that the Element (in conjunction with the other Elements) is capable of reliably meeting the capacity and other requirements of the Crossrail Programme Functional Requirements and the Sponsors Requirements.
TPA	CRL	Third Party Agreements
TSI		Technical Specifications for Interoperability
U&A	CRL	Undertakings and Assurances
VAP	LU	Verification Activity Plan
WPP	LU	Works Package Plan

Appendix 3 – Elements to Contracts

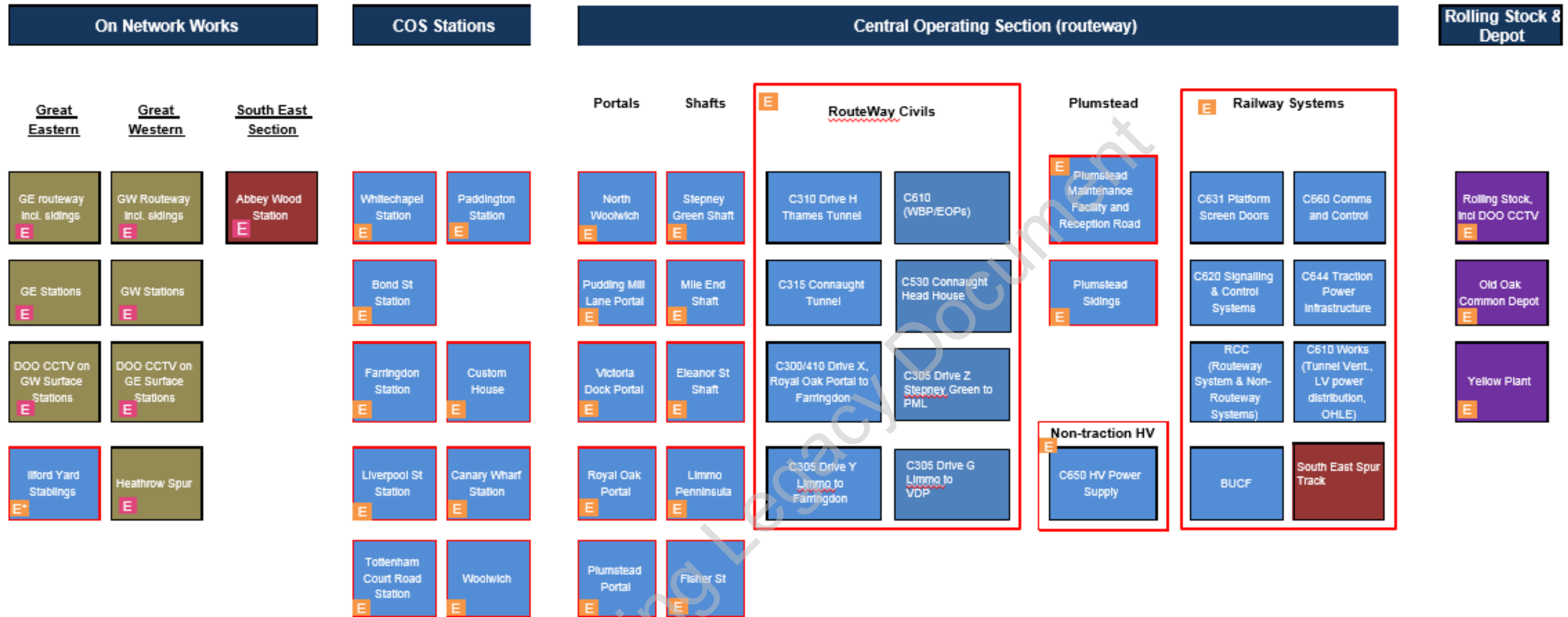
Group of Elements (Acceptance of Crossrail end-to-end)	Element (Handover of Ownership) 1) ECHR and ECHC apply only where "CRL" is entered in the column titled "Delivered By" and 2) the column titled "Party that receives handover" is either LU or RFL  Note No ECHR and ECHC are required for excluded scope (See Exclusions section below)	Content of Element (Brief description of what makes up each Element)	Delivered By	Party that receives handover	Future Operator (e.g IM under ROGS)	Asset Maintainer	Stage Req'd For																																																																	
Central Operating Section	RfL Routeway	1 Railway Systems	C660 Communications and Controls	CRL	RfL	RfL	RfL	3																																																																
			C620 Signalling & Control Systems	CRL	RfL	RfL	RfL	3																																																																
			C644 Traction Power Infrastructure	CRL	RfL	RfL	RfL	3																																																																
			C610 Track	CRL	RfL	RfL	RfL	3																																																																
			SE Spur Railway Infrastructure (principally track and OLE, but also GSM-R. GSM-R will stay with NR as IM)	NR/CRL <sup>13</sup>	RfL	RfL	RfL	3																																																																
			C610 Over Head Line Equipment	CRL	RfL	RfL	RfL	3																																																																
			C610 Low Voltage Power Distribution	CRL	RfL	RfL	RfL	3																																																																
			C610 Tunnel Ventilation	CRL	RfL	RfL	RfL	3																																																																
			Pudding Mill Lane ATFS <sup>4</sup>	CRL	NR	NR	NR	3																																																																
			Pudding Mill Lane ATFS <sup>4</sup>	CRL	RfL	RfL	RfL	3																																																																
			Westbourne Park Feeder	CRL	RfL	RfL	RfL	3																																																																
			ROC (Also known as RCC) CRL Systems C620 Signalling and Control, C660 Comms and Control, C610 Tunnel M&E	CRL	RfL	RfL	NR/RfL <sup>14</sup>	3																																																																
			BUCF Building (At TUCA) and CRL Systems (C620 Signalling and Control, C660 Comms and Control, C610 Tunnel M&E)	CRL	RfL	RfL	RfL	3																																																																
			C631 Platform Screen Doors	CRL	RfL	RfL	RfL	3																																																																
			C650 HV Power Supply	CRL	RfL	RfL	RfL	3																																																																
			RfL Stations	2 Non-traction power HV	C300 Drive X Royal Oak Portal to Farringdon	CRL	RfL	RfL	RfL	3																																																														
					C305 Drive Y Limmo to Farringdon	CRL	RfL	RfL	RfL	3																																																														
					C305 Drive G Limmo to Victoria Dock Portal	CRL	RfL	RfL	RfL	3																																																														
					C305 Drive Z Stepney Green to Pudding Mill Lane	CRL	RfL	RfL	RfL	3																																																														
					C310 Drive H Thames Tunnel	CRL	RfL	RfL	RfL	3																																																														
					C510 Platform Tunnel and SCL	CRL	RfL	RfL	RfL	3																																																														
					C315 Connaught Tunnel Refurbishment & Surface Railway Works	CRL	RfL	RfL	RfL	3																																																														
					C530 Connaught Tunnel Drainage Headhouse and Support Building	CRL	RfL	RfL	RfL	3																																																														
					RfL Stations	3 Tunnels (and structures)	C695 Civils drainage, laydown areas, train loading area	CRL	RfL	RfL	RfL	3																																																												
							C695 Structures Accommodation Bldg, Transformer, Undercover Stores, Maintenance Bldg, Cleaner's Bldg	CRL	RfL	RfL	RfL	3																																																												
							C695 Rail Maintenance Sidings and Shunting neck	CRL	RfL	RfL	RfL	3																																																												
							C695 Rail Signalling equipment rooms, train fuelling point, train wash	CRL	RfL	RfL	RfL	3																																																												
							C695 Landscaping	CRL	RfL	RfL	RfL	3																																																												
							Turn Out and Reception Road to transition point	NR	RfL	RfL	RfL	3																																																												
							C696 Plumstead Sidings (8 in total)	CRL	RfL	RfL	RfL	4																																																												
							C695 Cleaner's Bldg	CRL	RfL	RfL	RfL	4																																																												
							RfL Stations	4 Plumstead Maintenance Facility and Reception Road	C310 North Woolwich Portal	CRL	RfL	RfL	RfL	3																																																										
									C530 Fit out	CRL	RfL	RfL	RfL	3																																																										
									RfL Stations	5 Plumstead Sidings	C248 Pudding Mill Lane Portal Early Civil Works	CRL	RfL	RfL	RfL	3																																																								
											C350 Pudding Mill Lane Portal	CRL	RfL	RfL	RfL	3																																																								
											RfL Stations	6 North Woolwich Portal	C340 Victoria Dock Portal	CRL	RfL	RfL	RfL	3																																																						
													C330 Royal Oak Portal Civils	CRL	RfL	RfL	RfL	3																																																						
													C336 Royal Oak Portal Head House	CRL	RfL	RfL	RfL	3																																																						
													RfL Stations	7 Pudding Mill Lane Portal	C310 Plumstead Portal	CRL	RfL	RfL	RfL	3																																																				
															C530 Fit out	CRL	RfL	RfL	RfL	3																																																				
															RfL Stations	8 Victoria Dock Portal	C305 Stepney Green Shaft	CRL	RfL	RfL	RfL	3																																																		
																	C360 Stepney Green Shaft Finishing	CRL	RfL	RfL	RfL	3																																																		
																	RfL Stations	9 Royal Oak Portal	C360 Mile End Shaft	CRL	RfL	RfL	RfL	3																																																
																			C360 Eleanor St Shaft	CRL	RfL	RfL	RfL	3																																																
																			RfL Stations	10 Plumstead Portal	C305 Limmo Peninsula Shaft	CRL	RfL	RfL	RfL	3																																														
																					C360 Limmo Peninsula Shaft Finishing	CRL	RfL	RfL	RfL	3																																														
																					RfL Stations	11 Stepney Green Shaft	C410 Fisher St Shaft	CRL	RfL	RfL	RfL	3																																												
																							C360 Fisher St Shaft Finishing	CRL	RfL	RfL	RfL	3																																												
																							RfL Stations	12 Mile End Shaft	C502 LIS Main Station Wrks/Fit-out/M&E	CRL	LUL	LUL	LUL	3																																										
																									C501 LIS Station Piling & Diaphragm Wall	CRL	LUL	LUL	LUL	3																																										
																									RfL Stations	13 Eleanor St Shaft	C510 Platform Tunnel and SCL	CRL	LUL	LUL	LUL	3																																								
																											C660 Communications and Controls (@ station)	CRL	LUL	LUL	LUL	3																																								
																											RfL Stations	14 Limmo Peninsula Shaft	C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3																																						
																													LU Station Operation Rooms <sup>2</sup>	LUL	LUL	LUL	LUL	3																																						
																													RfL Stations	15 Fisher St Shaft	C412 BOS Main Sta Wrks/Fit-out/M&E	CRL	LUL	LUL	LUL	3																																				
																															C411 BOS Piling and Dia Wall	CRL	LUL	LUL	LUL	3																																				
																															RfL Stations	16 Liverpool Street station	C410 BOS Access shafts & SCL Works	CRL	LUL	LUL	LUL	3																																		
																																	C660 Communications and Controls (@ station)	CRL	LUL	LUL	LUL	3																																		
																																	RfL Stations	17 Bond Street Station	C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3																																
																																			LU Station Operation Rooms <sup>2</sup>	LUL	LUL	LUL	LUL	3																																
																																			RfL Stations	18 Tottenham Court Road Station	C422 TCR Main Station Wrks/Fit-out/M&E	CRL	LUL	LUL	LUL	3																														
																																					C421 TCR Piling and Dia Wall	CRL	LUL	LUL	LUL	3																														
																																					RfL Stations	19 Farringdon Station	C410 TCR Access shafts & SCL Works	CRL	LUL	LUL	LUL	3																												
																																							C660 Communications and Controls (@ station)	CRL	LUL	LUL	LUL	3																												
																																							RfL Stations	20 Whitechapel Station	C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3																										
																																									LU Station Operation Rooms <sup>2</sup>	LUL	LUL	LUL	LUL	3																										
																																									RfL Stations	21 Custom House Station	C435 FAR Main Sta Wrks/Fit-out/M&E	CRL	LUL	LUL	LUL	3																								
																																											C430 FAR Station Shaft/Piling/Dia Wall	CRL	LUL	LUL	LUL	3																								
																																											RfL Stations	22 Canary Wharf Station	C660 Communications and Controls (@ station)	CRL	LUL	LUL	LUL	3																						
																																													C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3																						
																																													RfL Stations	23 Woolwich Station	LU Station Operation Rooms <sup>2</sup>	LUL	LUL	LUL	LUL	3																				
																																															C512 WHI Station Wrks, Fit-out + M&E	CRL	LUL	LUL	LUL	3																				
																																															RfL Stations	24 Paddington Station	C511 WHI Station Piling & Dia Wall	CRL	LUL	LUL	LUL	3																		
																																																	C510 Platform Tunnel and SCL	CRL	LUL	LUL	LUL	3																		
																																																	RfL Stations	21 Custom House Station	C660 Communications and Controls (@ station)	CRL	LUL	LUL	LUL	3																
																																																			C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3																
																																																			RfL Stations	22 Canary Wharf Station	LU Station Operation Rooms <sup>2</sup>	LUL	LUL	LUL	LUL	3														
																																																					C520 Main Works	CRL	RfL	MTR	RfL	3														
																																																					RfL Stations	23 Woolwich Station	C660 Communications and Controls (@ station)	CRL	RfL	MTR	RfL	3												
																																																							C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3												
																																																							RfL Stations	24 Paddington Station	CW02 Canary Wharf Station Main Works	CRL (CWG)	RfL	MTR	RfL	3										
																																																									Station Operation Room Works	CRL	RfL	MTR	RfL	3										
																																																									RfL Stations	21 Custom House Station	C660 Communications and Controls (@ station)	CRL	RfL	MTR	RfL	3								
																																																											C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3								
																																																											RfL Stations	22 Canary Wharf Station	Berkley Homes D&B Station Box	CRL (BH)	RfL	MTR	RfL	3						
																																																													C310 Low Level Works	CRL	RfL	MTR	RfL	3						
																																																													RfL Stations	23 Woolwich Station	C530 Fit out	CRL	RfL	MTR	RfL	3				
																																																															C660 Communications and Controls (@ station)	CRL	RfL	MTR	RfL	3				
																																																															RfL Stations	24 Paddington Station	C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3		
																																																																	C405 PAD Main Station Wrks-Fit Out/M&E	CRL	RfL	MTR	RfL	3		
																																																																	RfL Stations	21 Custom House Station	C660 Communications and Controls (@ station)	CRL	RfL	MTR	RfL	3
																																																																			C690 Automatic Fare Collection Gatelines and Ticket Machines	CRL	TfL	TfL	TfL	3

Group of Elements (Acceptance of Crossrail end-to-end)	Element (Handover of Ownership)	Content of Element (Brief description of what makes up each Element)	Delivered By	Party that receives handover	Future Operator (e.g IM under ROGS)	Asset Maintainer	Stage Req'd For				
Rolling Stock and Depots	25	Rolling Stock	Class 345 manufacture, delivery and acceptance	RfL	RfL	MTR <sup>7</sup>	TfL	1,5			
	26	Old Oak Common Depot	Section A (Roads M1 – M9)	RfL	RfL/ Bombardier <sup>8</sup>	Bombardier	RfL/ Bombardier <sup>8</sup>	2			
			Section B (Roads S10 – S33)	RfL	RfL/ Bombardier <sup>8</sup>	Bombardier	RfL/ Bombardier <sup>8</sup>	2			
			Section C (Roads S34 – 43)	RfL	RfL/ Bombardier <sup>8</sup>	Bombardier	RfL/ Bombardier <sup>8</sup>	2			
	27	Ilford Yard Stabling	C828 Paint shop , Logistics & Stores, Workshop A upgrade, wheel lathe road embedded track, external car park, sub-station	CRL	Bombardier	Bombardier	Bombardier	1			
			C828 Depot Training Centre	CRL	GA Franchisee	GA Franchisee	NR	n/a			
			C828 Plessey Rd Electrification	CRL	NR	NR	GA Franchisee	1			
			C828 Operations and Welfare Bldg	CRL	GA Franchisee	GA Franchisee	NR	1			
			C828 10 new 205m sidings	CRL	GA Franchisee/NR	GA Franchisee	NR	1			
	28	Yellow Plant	Rail Milling Machine	RfL	RfL	RfL/TU <sup>9</sup>	RfL/TU <sup>9</sup>	3			
			Track Maintenance Train	RfL	RfL	RfL/TU <sup>9</sup>	RfL/TU <sup>9</sup>	3			
			Overhead Line Maintenance Train	RfL	RfL	RfL/TU <sup>9</sup>	RfL/TU <sup>9</sup>	3			
Infrastructure Monitoring Vehicle			RfL	RfL	RfL/TU <sup>9</sup>	RfL/TU <sup>9</sup>	3				
South East Spur	1	Abbey Wood Station	NR	NR <sup>15</sup>	MTR <sup>5</sup>	NR	3				
		All station D&B contracts (Main station works)	NR	RfL <sup>15</sup>	MTR <sup>5</sup>	RfL	3				
		Communications Equip Room/Signalling Equipment Room	NR	RfL <sup>15</sup>	MTR <sup>5</sup>	RfL	3				
Great Eastern	2	On-network works routeway	All GE NR infrastructure enhancement works	NR	NR	NR	NR	4			
		Gidea Park Sidings, Shenfield Sidings	NR	NR	NR	NR	1				
	3	GE Stations <sup>17</sup>	Stratford	NR	RfL/MTR <sup>14</sup>	tdb	RfL	4			
			Maryland	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Forest Gate	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Manor Park	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Ilford	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Seven Kings	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Goodmayes	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Chadwell Heath	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Romford	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Gidea Park	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Harold Wood	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Brentwood	NR	RfL/MTR <sup>14</sup>	MTR	RfL	4			
			Shenfield	NR	RfL/MTR <sup>14</sup>	GA Franchisee	GA Franchisee	4			
			4	Early on-network works	DOO-CCTV, stepping and gauging	NR	RfL	MTR	RfL	1	
			Great Western	5	On-network works routeway	All GW NR infrastructure enhancement works	NR	NR	NR	NR	4
					Maidenhead Sidings	NR	RfL	RfL	RfL	5	
6	GW Stations <sup>17</sup>	Reading		NR	NR/SFO	GW	NR	5			
		Twyford		NR	NR/SFO	GW Franchisee	NR	5			
		Maidenhead		NR	NR/SFO	GW Franchisee	NR	5			
		Taplow		NR	NR/SFO	MTR	RfL	5			
		Burnham		NR	NR/SFO	MTR	RfL	5			
		Slough		NR	NR/SFO	GW Franchisee	NR	5			
		Langley		NR	NR/SFO	MTR	RfL	5			
		Iwer		NR	NR/SFO	MTR	RfL	5			
		West Drayton		NR	NR/SFO	MTR	RfL	5			
		Hayes and Harlington		NR	NR/SFO	MTR	RfL	2			
		Southall		NR	NR/SFO	MTR	RfL	2			
		Hanwell		NR	NR/SFO	MTR	RfL	2			
		West Ealing		NR	NR/SFO	MTR	RfL	2			
		Ealing Broadway		NR	NR/SFO	MTR	RfL	2			
		Acton Main Line		NR	NR/SFO	MTR	RfL	2			
7	DOO CCTV Works on stations	DOO-CCTV	NR	RfL	MTR	RfL	2				
Heathrow Spur	8	On-network works	Note Infrastructure owner will be HAL- no plans for DOO CCTV equipment	NR	HAL	NR	HAL	2			
Crossrail Project Works Exclusions - This scope, although required for Crossrail infrastructure, does not form part of a formal Handover transaction between CRL and the respective receiving Party, therefore no ECHR and ECHC are required.  This includes enabling works that do not form part of the final Handover.		C641 Kensal Green Bulk Supply Point	National Grid	National Grid	National Grid	National Grid	3				
		Kensal Green Bulk ATFS	NR	NR	NR	NR	3				
		C643 Pudding Mill Lane Bulk Supply Point	National Grid	National Grid	National Grid	National Grid	3				
		C651 Limmo BSP	UKPN	UKPN	UKPN	UKPN	3				
		ROC Bldg (Also known as RCC) (At Romford)	NR	NR	NR	NR	3				
		LU02 Farringdon Enabling Works	LUL	LUL	LUL	LUL	n/a				
		LU03 Bond Street Passenger Link Tunnel Civils	CRL	LUL	LUL	LUL	3				
		LU04 TCR, Goslett Yard Main Works	LUL	LUL	LUL	LUL	3				
		LU06 Liverpool Street Enabling Works	LUL	LUL	LUL	LUL	3				
		LU07 Whitechapel Enabling Works	LUL	LUL	LUL	LUL	3				
		LU08 Non-Traction Power Supply Griffith House 2/	LUL	LUL	LUL	LUL	3				
		LU15 Bakerloo Link (Paddington St)	LUL	LUL	LUL	LUL	3				
		A014 Bond Street Urban Realm	CRL	LUL	LUL	LUL	3				
		A015 TCR Urban Realm	CRL	LUL	LUL	LUL	3				
		A016 Farringdon Urban Realm	CRL	LUL	LUL	LUL	3				
		A017 Liverpool St Urban Realm	CRL	LUL	LUL	LUL	3				
		A018 WHI Urban Realm	CRL	LUL	LUL	LUL	3				
		C336 New Substation (LV&HV) (Paddington New Yard)	CRL	NR	NR	NR	-				
		C336 Green Lane Bridge Protection (Paddington New Yard)	CRL	NR	NR	NR	-				
		C336 New Elevated Bus Deck (Paddington New Yard)	CRL	Tower Transit	Tower Transit	tdb	n/a				
		C336 Lafarge Tarmac Replacement Batching Plant (Paddington New Yard)	CRL	Lafarge Tarmac	Lafarge Tarmac	Lafarge Tarmac	n/a				
		C338 Mechanical and Electrical work for Lafarge Tarmac Replacement Batching Plant (Paddington New Yard)	CRL	Lafarge Tarmac	Lafarge Tarmac	Lafarge Tarmac	n/a				
		C339 Rail Discharge System and Feed Conveyors works for Lafarge Tarmac Replacement Batching Plant (Paddington New Yard)	CRL	Lafarge Tarmac	Lafarge Tarmac	Lafarge Tarmac	n/a				
		C212 LIS Station (Demo Adv Wrks-comb)	CRL	LUL	LUL	LUL	n/a				
		C210 LIS Station (Civ Adv Wrks Pk 2)	CRL	LUL	LUL	LUL	n/a				
		C216 LIS Civ Adv Wrks Util, svcs Pk	CRL	LUL	LUL	LUL	n/a				
		C503 LIS Civ Adv Wrks Pkg 1 UKPN Substation and Public Utilities Diversions	CRL	LUL	LUL	LUL	n/a				
		C207 Bond Street Station	CRL	LUL	LUL	LUL	n/a				
		C240 Bond Street (Civils)	CRL	LUL	LUL	LUL	n/a				
		C208 Demolition	CRL	LUL	LUL	LUL	n/a				
		C209 ETH Demolition and Utilities	CRL	LUL	LUL	LUL	n/a				
		C217 WHI Station Civ 2 Rail Civ & Util	CRL	LUL	LUL	LUL	n/a				
		C244 WHI Civ 1 Deck East London Line	CRL	LUL	LUL	LUL	n/a				
		C245 Civils/Dem/Utilities	CRL	LUL	LUL	LUL	n/a				
		Electra TfL Contract (Automatic Fare Collection Gatelines and Ticket Machines)	NR	TfL	TfL	TfL	TfL	2,4,5			

- Notes:**
- Not all assets/systems within a station facility are handed over to a single IM, although there is a "principal IM" for each Element (indicated in the list above)
  - Bakerloo Line Link, Griffiths House and LU SORI are all delivered by LUL under a WPP on behalf of CRL and are handed over to LUL
  - There are other interface works delivered by CRL (LIS Substation) and LUL (E&B Immunisation) which need to be completed and handed over to support the operation of CRL Central. These are not shown in the table above.
  - Site is owned by RfL, the equipment within the site is owned by NR. This asset is not subject to the CRL Handover Strategy
  - NR will handover to MTR Crossrail on 31 Oct 2017.
  - MTR Crossrail initially take over GE stations on 31/5/2015 as part of franchise change
  - MTR Crossrail are the Railway Undertaking company
  - Bombardier are the "DFO" - Depot Facility Owner; RfL are the long term leaseholder
  - RfL will appoint maintenance contractor (Transport Undertaker) through a concession similar to how MTR is providing the passenger service
  - Some of the DOO-CCTV will need to be handed over as part of stage 2 (stations up to airport junction). The remainder can wait until 10th Sept 2018
  - This is the first date of a rolling production line - handover of trains will take place over a period of time to support all stages of CRL opening
  - This scope is delivered by NR and forms part of the Great Eastern and Great Western stations scope
  - Refer to Figure 15 for clarity
  - NR handed over GE stations to TfL Rail on 28th May 2015 (Stage 0), which handed over in turn to RfL on 1st April 2017 to support Stage 1. RfL are the asset owner (leaseholder) on GE stations.
  - NR are accountable for asset/station. NR are the freeholder and maintainer, MTR are the leaseholder and NR will transfer the station to MTR.
  - NR is the Facility Owner of the Romford ROC of which the RCC is part, RfL is likely to be tenant in the building. The building including services will be provided by NR, and the CRL rail systems by CRL
  - DOO CCTV equipment will be owned and maintained at all stations by RfL, even when CTOC is not the operator
  - 4G and WiFi excluded at this point until TfL Programme is clarified
  - Handover date of 21st May 2019 represents Handover of all GE Stations and works to support Stage 4

Appendix 4 – Crossrail Handover Scope Map

Version 4 September 2019



**E** Element = CRL Handover to an "Operator" i.e. NR/RFLI\*/LUL (**25 x Elements**) (9 x stations, 5 x shafts, 5 x portals, 1 x RouteWay Civils, 1x railway systems, 1 x non-traction HV networks, 2 x Plumstead, 1 x Ilford); and RFL procure for RFLI (**3 x Elements**) (1 x OOC, 1 x Class 345, and 1 x yellow plant)

**E** ONW Element = NR Handover to either NR or TOC (**8 x ONW Elements**) (3 x stations (SE/GE/GW), 3 x routeways (GE/GW/Heathrow Spur), and 2 x DDO CCTV (GE/GW))

**Key**

Surface Director
Delivery Director
Operations Director
LUCT
Network Rail

Red outline = Element Handover from CRL  
 \* RfL then hand stations to MTR  
 + CRL using NR AMP process for Handover

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